

AMC[®]



Program & Proceedings

Advanced Materials Congress

28 - 31 August 2023
Stockholm, Sweden

Fellow Summit
Baltic Conference
Series

Advanced Energy Materials &
Technology Congress

Organizer

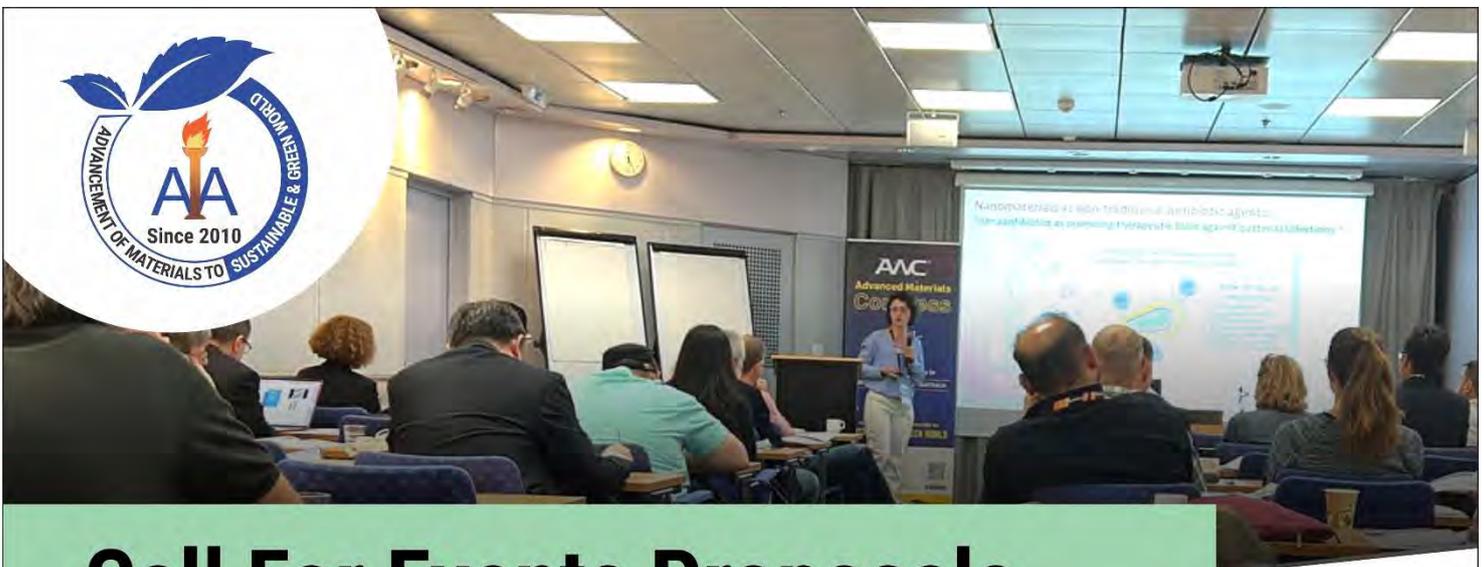


International Association of
Advanced Materials
Org. 802503-6784

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www.advancedmaterialscongress.org



Call For Events Proposals

Expanding the International Network, Collaboration, and Exchange
by Hosting IAAM Events, Conferences and Symposia

How to get involved with IAAM events?

IAAM seeks thematic sessions and symposium proposals for the IAAM's upcoming events and assemblies. Please submit a proposal and nominate researchers to be eligible for the invited speakers, session chairs or co-chairs with their updated CV(s) at:

E-mail: coordinator@advancedmaterialscongress.org

Meetings & Events

To promote collaboration and scientific advancements, IAAM events and conferences provide an international platform for the widespread dissemination of the recently emerged advanced research pertaining to the interdisciplinarity field of science, engineering, and technology. In such multidisciplinary conferences, researchers professionals from academia and industries come together for exchange of knowledge and networking. The business council of IAAM allows business giants to present their innovative products and gain invaluable insights and develop partnerships. With its multiple forums, IAAM facilitates global networking, partnerships and provides opportunities to students and young researchers to shape their work.

Call for Event Proposals

The International Association of Advanced Materials encourages individuals, organizations, and industries to organize thematic sessions/ symposia or to host assemblies of the Advanced Materials Congress Baltic Conference Series, World Congress Series, Online/LIVE Conferences, and WebCongress. IAAM calls for a proposal to host and co-host its upcoming meeting and events.

Submit Event Proposals

The IAAM calls to researchers, academic institutions, industries, non-profit organizations, and policymakers for hosting its events, symposiums, and conferences and contribute to the greater cause of advancement of materials for the betterment of society.

Researchers can submit their proposals for organizing thematic sessions and symposia in upcoming assemblies of the Advanced Materials Congress, Baltic Conference Series, World Congress Series, and WebCongress.

Please **DOWNLOAD TEMPLATE** of Event Proposal from the website to organize thematic sessions and symposia or to host the upcoming assemblies of IAAM Events in the prescribed format by E-mail to:

coordinator@advancedmaterialscongress.org

www.iaamonline.org/call-for-events-proposals

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Closing of **Onsite** Congress

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Closing of Online LIVE Congress



Chairs Message

Dear Delegates,

The International Association of Advanced Materials (IAAM) welcomes all of you in the 55th assembly of Advanced Materials Congress (AMC), 28 - 31 August 2023 in Stockholm, Sweden. **This assembly brings together the Baltic Conference Series, Advanced Energy Materials & Technology Congress, IAAM Fellow Summit (Baltic Fellow Summit) and Advanced Materials Lecture Series under one roof, offering a unique hybrid experience.** This congress is organized with Onsite and Online LIVE Hybrid Setups, where onsite sessions will be hosted at the Conference Center, M/S Gabriela, Viking Line (Stockholm-Helsinki-Stockholm). The onsite sessions will be continued during sailing from city of Stockholm, Sweden on 28 August to Helsinki, Finland and return to Stockholm, Sweden on 29 August in the immersive **Knowledge Experience at Sea™** format. The online sessions will be conducted LIVE from IAAM's head office in Ulrika, Sweden. **The online and onsite sessions run on (Stockholm Time, CEST, GMT+2) Sweden time zone, however at day 2 onsite program will run on Finland time zone (Finland Time, CEST, GMT+3).**

The AMC assembly is comprehensive advanced materials forum for understanding the trends and deep intuition for academia and industry. **IAAM has been accredited by the United Nations for its climate and water activities aligned with the Sustainable Development Goals.** On March 22, 2023, at the United Nations Headquarters in New York, the IAAM participated in a water conference to integrate knowledge about water security. IAAM hosted UN 2023 Water Conference Side Event with the release of the 13th Annual Book of the IAAM (ISBN 987-91-88252-39-5), detailing the association's work. IAAM follow "**Advancement of Materials to a Sustainable and Green World**" and contributing significantly towards policy and governance robustness for the green transition. The congress will cover onsite welcome ceremony, IAAM felicitation ceremony, keynote, invited, oral and poster presentations. **Congress received 506 abstracts from 31 countries and will be presenting 207 presentations from all five continents (America, Europe, Asia, Australia, and Africa). The congress will consist of 41 thematic sessions (17 onsite and 24 online sessions), chaired by 85 renowned experts, total 72 hours over four days, covering Materials presentations for the functional, composite, structural and bio-medical applications.** This assembly addressing pollution, reducing reliance on non-renewable energy sources, and adopting low-carbon materials as essential steps toward creating a circular market.

This Baltic congress assembly will carry together focused symposia and conclave to discuss recent trends and profound awareness in areas such as Environment and Sustainability (SDG 3, 7, 12 and 13), Drug Delivery and Formulation (SDG 3 and 9), Water Research and Technology (SDG 6), Polymer (SDG 12) and Energy Materials and Technology (SDG 7) among academia and industry, to address the SDGs. Baltic Water Conclave will be organized as session 17 to discuss sustainability, innovation and societal impact with panelists and experts from others scientific organizations. IAAM efforts align with the SDGs along with the Conference of the Parties (COP), and European Green Deal (EGD), which also emphasizes sustainability, net-zero, and circular processes. The IAAM proceedings cover a wide range of materials topics covering Electronic, Magnetic, Optical, Nano, Bio, Green, Quantum, Engineering, Smart, Functional, Interface, Electrolytic, Tissue Engineering, and more. BCS discussed Innovation in Energy, Healthcare, and Environment, with findings, and limitations for the circular sustainability. IAAM hosts excellent conferences for materials professionals to create a sustainable world and contribute to SDG 17 by fostering networking between stakeholders. **This Baltic assembly welcomes esteemed IAAM Fellows admitted in 2023, delegates of several European scientific organizations, Ministry of Science & Technology- India, Chinese Academic of Science, China and other valued organisations and industry. IAAM offers world-class congress assemblies, connects worldwide IAAM members through Online LIVE to make everyone accessible to this exciting global meet, and develops decisive materials world.**

We look forward to meeting all of you and engaging in fruitful discussions.

Sincerely,

55th AMC assembly Chairs

Dr. Qingyuan Wang and Dr. Rajendra Singh



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Advanced Materials Congress

Bringing together industry and academia to discuss recent developments, share experiences, explore collaborations, and new ideas.

The 55th assembly of Advanced Materials Congress is intended to outline an demanding discussions and collaborations among participants, to improve and enlarge the knowledge of advanced research, and to surge innovation and awareness for the technological needs in the areas of materials, engineering and technology among the global experts. An International Scientific Carnival to create cross disciplinary World R&D Links and consortiums in Health, Energy, and Environment. European Congress Series has stimulated and ignite an interest of advanced materials to achieve the goal of a building a sustainable world for the future generation.

This assembly will run with Onsite and Online LIVE Hybrid Setups.

This 55th AMC assembly represents **merger of all global experts view and discussions** that generate opportunity among delegates to extend their presence with respect to exchange of research, networking and publication more accessible than ever before. Major benefit of this European AMC assembly are developing understanding, knowledge and networking for development objectives in the **Environment and Sustainability, Drug Delivery and Formulation, Carbon Materials & Technology, Water Research and Technology, Polymer, Battery & Supercapacitor Technology and Energy Materials and Technology** Sessions & Symposia, www.advancedmaterialscongress.org where best research minds of academia and industry discuss the plan towards climate neutrality, net zero, practices. Importantly, topical events mentioned below will provide additional strength to the online and onsite participants. AMC assembly in Europe creates global networking with European experts and facilitates multi-disciplinary cooperation for research, innovations, and technology that results in translational developments. This assembly will offer coordination of the following contemporary research fields to pave the way for multi-inter-trans-disciplinary research and innovations for the market.

www.advancedmaterialscongress.org

SUBJECT AREA

- Nanomaterials & Nanotechnology
- Drug Delivery & Tissue Engineering
- Biomaterials & Biodevices
- Electronic, Magnetic & Optical Materials
- Structural & Engineering Materials
- Thin Films, Materials Surface & Interfaces
- Computational Materials & Modelling
- Functional Materials
- Energy Materials & Technology
- Water Research & Technology
- Biosensor & Bioelectronics
- Membrane Science, Engineering & Technology
- Carbon Materials & Technology
- Batteries, Supercapacitors & Electrolytic Materials
- Polymer Science & Technology
- Composite & Ceramic Materials
- Environmental & Green Materials
- Sustainable Construction & Building Materials
- Graphene Innovations & Technology
- Quantum Science & Technology
- Climate Neutrality
- Polysaccharide and Polymer
- Metamaterials
- Self Powered Technology
- Net Zero Technology
- Wood & Biomass Based Technology
- Fuel Cells and Biofuels
- Hydrogen & Nuclear Energy
- Nanoglasses
- Catalytic Materials

Organizer



IAAM[®]
International Association of
Advanced Materials



Dr. Ashutosh Tiwari

Secretary General

International Association of Advanced Materials

E-mail: director@iaam.se

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The IAAM congress brings together young researchers and students from various disciplines under one roof. The International Association of Advanced Materials (IAAM) has committed to aligning with the United Nations’ Sustainable Development Goals (SDGs) for the upcoming decade. Under the slogan ‘[Advancement of Materials to Sustainable and Green World](#)’ IAAM congress brings together researchers, engineers, students, professionals, and business leaders to share their breakthrough innovations and discoveries on a global scale. IAAM recognizes that a sustainable future is crucial and strives to align with the United Nations’ Sustainable Development Goals. The congress uses a unique format, “**Knowledge Experience at Sea™**,” to promote interaction and discussion among attendees. IAAM congresses provide excellent speakers, interdisciplinary research presentations, symposia, and networking opportunities for industry and academia. Additionally, there are commercial product launches and cultural experiences while cruising.

HIGHLIGHTS

- A series of keynote and invited talks, as well as extensive oral and poster sessions.
- Congress is riding the science, engineering, and technology wave.
- Delegates will have full access to the concurrent conference tracks, allowing them to mix and match presentations and maximize networking opportunities.
- The congress assembly will begin on **28th August 2023** from Stockholm, Sweden and will conclude on **31st August 2023**.
- A face-to-face interaction between exhibitors and sponsors. Business technocrats are present.
- While cruising, the highest level of interaction and the most vibrant discussions.
- The “**Knowledge Experience at Sea™**” format ensures maximum interaction and lively discussion by cramming everyone aboard a single vessel while sailing.
- The congress will provide you with an unforgettable experience through eminent speakers’ lectures, high-quality presentations, and global networking.
- Excellent Baltic cruise hospitality with culture, and social activities in important regions (Stockholm, Sweden to Helsinki, Finland).
- This journey consist of views of several archipelago's population, islands, cays, and islets in the charismatic Baltic Ocean as well as beautiful architectural and natural attraction.

IAAM Fellow Summit

Platform for discussing and advancing global efforts to manage climate change and related challenges.

IAAM Fellow Summit serves as a platform for discussing and advancing global efforts to manage climate change and related challenges. The summit is expected to be an important opportunity for high-end researchers, policymakers, industry leaders, and government agencies to promote their climate ambitions, present their plans for reaching net zero, and make new commitments to tackle climate change.

The IAAM Fellow Summit brings together the best research minds of the Advanced Materials academia and industry to accelerate action towards climate neutrality, net-zero, carbon capture, global warming, etc. The International Association for Advanced Materials (IAAM) is holding its annual Fellow Summit in conjunction with the 55th Advanced Materials Congress assemblies. IAAM Fellow Summit will promote the utilization of sustainable materials by ensuring a more sustainable future while supporting economic growth and improving the well-being of people and communities around the world.

To learn about the IAAM Fellow Summit, please visit:

www.advancedmaterialscongress.org/fellow-summit



Highlights of the IAAM Fellow Summit

- Promoting sustainable development plans for reaching net-zero emissions
- International cooperation in climate change adaptation
- Discussions on effective water management and governance
- Endorsing renewable energy sources
- Promoting net-zero research practices
- Participation of high-end researchers, policymakers, industry leaders, and government agencies
- Consortiums on Net-Zero Goals and Sustainable Developments.

Materials Innovation for Sustainability

With Great Concern for Global Prosperity, IAAM works to further the UN Agenda of Sustainable Development



SDGs: Advancement of Materials to Sustainable and Green World

International Association of Advanced Materials has committed to work in line with the United Nations' Sustainable Development Goals (SDGs) for the new decade. The association has stepped into the next decade by declaring its slogan 'Advancement of Materials to Sustainable and Green World'. In line with its accumulative sustainable development agenda, the association puts world-wide efforts with Materials Science, Engineering, and Technology across spheres of academia and industry towards potentially addressing the challenges of sustainability of materials for a green world.

To know about the IAAM Fellow Summit, please visit:

www.iaamonline.org/advancement-of-materials-to-sustainable-and-green-world



Sessions & Symposia

Symposia	Target Sustainable Development Goals (SDGs)
Environment and Sustainability	SDG 3, 7, 12 and 13
Water Research and Technology	SDG 6
Drug Delivery and Formulation	SDG 3 and 9
Energy Materials and Technology	SDG 7
Polymer	SDG 9 and 12
Consortium, Innovation, Industry and Partnership	SDG 9 and 17

Summary of **Onsite** and **Online LIVE** Program

Day - 1: Monday, 28 August 2023 Stockholm, Sweden Central European Summer Time (GMT+2) Time Zone for Online LIVE & Onsite : GMT+2 (Sweden)		Day - 2: Tuesday, 29 August 2023 Port of Helsinki, Finland Time Zone for Onsite : GMT+3 (Finland Time) Time Zone for Online LIVE : GMT+2 (Sweden Time)	
Opening of Congress and Session 1 to 5 (Online LIVE)	08.00 – 18.30	Online LIVE Session 6 to 10 Time Zone: GMT+2 (Sweden Time)	07.00 – 18.30
Registration (Onsite) at Viking Line Terminal, Stadsgården, 11630 Stockholm, Sweden	09.30 – 10.30	Time Zone for Onsite : GMT+3 (Finland Time) Breakfast at The Buffet, Deck 8	07.30 – 08.30
Check-in & Boarding (Onsite), M/S Gabriella, Viking Line Cruise. Drop Luggage at Conference Auditorium, Deck 10, Conference Centre	10.30 – 11.00	Session 9, 10, 11 (Onsite), Deck 10	09.00 – 10.45
Welcome Message and (Onsite) Instructions, Deck 10, Auditorium B	11.00 – 11.15	Coffee, Conference Center, (Onsite), Deck 10	10.45 – 11.00
Session 1 (Onsite), Deck 10, Auditorium B	11.15 – 13.00	Session 12, 13, 14 (Onsite), Deck 10	11.00 – 12.00
Lunch (Onsite), Deck 8	13.00 – 14.00	Lunch at The Buffet, Deck 8	12.00 – 13.00
Cabin Access and Poster Setup	14.00 – 15.00	Social Activity, Sightseeing Helsinki*	13.30 – 15.30
Session 2, 3, 4 (Onsite), Deck 10	15.00 – 16.45	Break	15.30 – 16.00
Coffee, Conference Center, Deck-10, Poster Setup	16.45 – 17.00	Session 15, 16, 17 (Onsite), Deck 10, Auditorium B	16.00 – 19.15
Session 5, 6, 7 (Onsite), Deck 10	17.00 – 18.30	Closing Ceremony (Onsite): Announcements of Best Presentations, Conference Center, Deck-10, Auditorium B	19.15 – 19.30
Poster Session 08 (Onsite), Deck 10	18.30 – 19.30	Dinner (Onsite) at The Buffet, Deck 8	19.30 – 20.30
Dinner (Onsite) at The Buffet, Deck 8	19.30 – 20.30	Cultural Program (Onsite), Deck 8	21.00 – 22.00
Cultural Program (Onsite), Deck 8	21.00 – 22.00	Cultural Program (Onsite), Deck 8	21.00 – 22.00
Day - 3: Wednesday, 30 August 2023 Port of Stockholm, Sweden Time Zone for Online LIVE : GMT+2 (Sweden Time)		Day - 4: Thursday, 31 August 2023 Time Zone for Online LIVE : GMT+2 (Sweden Time)	
Breakfast at The Buffet, Deck 8	07.30 – 08.30	Online LIVE Session 17 to 24 Time Zone: GMT+2 (Sweden Time)	07.00 – 19.00
Online LIVE Session 11 to 16 Time Zone: GMT+2 (Sweden Time)	07.00 – 18.30		
Check Out* from the Cabin with Luggage and Disembarkation from the Viking Cruise (Onsite)	09.30 – 10.00		
Social Activity in Stockholm** Meeting on Cruise Information Desk at Deck 7 at 09.30 (Onsite)	10.30 – 12.00	Closing Ceremony of Online LIVE Sessions Time Zone: GMT+2 (Sweden Time)	19.00 – 19.30
Commencement of Tour at Central Train Station, Stockholm (Onsite)	12.00	Important information <ul style="list-style-type: none"> 55th AMC Assembly will be organized with Hybrid Setups. Online LIVE sessions, scheduled at Central European Summer-CEST, GMT+2 Onsite program will be organized as per the local time - Day 1 and 3: Swedish time (GMT+2) and Day 2: Finish time (GMT+3). 	
*Meeting place: Cruise Information Desk at Deck 7. Please carry your passport and Cabin Key with you. (Onsite) #Carry your luggage and be seated on bus. The bus will drop to Stockholm Central Railway Station after sightseeing. (Onsite) #Tentative summary, may vary after final confirmation.		Social Activity for Networking Cultural Programme: A variety of Scandinavian Cultural Programme is available in the evening at Club Mar, Deck 8. *Sightseeing in Helsinki (Day 2): Meeting Place, Cruise Information Desk on Deck 7 at 14.15 (arranged for registered participants). **Sightseeing in Stockholm (Day 3): Meeting Place, Cruise Information Desk on Deck 7 at 09.30 (arranged for registered participants).	

Summary of Onsite Sessions

Session Venue Chart			
Venue Conference Center, M/S Mariella, Deck - 10			
	*Room 1	*Room 2	*Room 3
DAY 1: Monday 28 August 2023 Port of Stockholm, Sweden Central European Summer Time (GMT+2)	Opening Ceremony		
	Session 01: Functional Materials		
	Session 02: Hydrogen Energy & Battery	Session 03: Nanomaterials & Nanotechnology	Session 04: Structural & Engineering Materials
	Session 05: Electronic, Magnetic & Optical Materials	Session 06: Functional Materials	Session 07: Environment & Sustainability Symposium
	Session 08: Poster Session		
	DAY 2: Tuesday 29 August 2023 Port of Helsinki, Finland Central European Summer Time (GMT+3)	Session 09: Polymer Symposium	Session 10: Biomaterials & Biodevices
Session 12: Battery & Supercapacitor Technology		Session 13: Computational Materials & Modelling	Session 14: Thin Films, Materials Surface & Interfaces
Session 15: Environment & Sustainability Symposium			
Session 16: Water Research and Technology Symposium			
Session 17: Baltic Water Conclave			
Closing Ceremony			
<p>*For Opening Ceremony, Session 1, 17 and closing Ceremony, the Room 1 will be Auditorium B, Deck 10. *For other sessions follow Room 1, 2 and 3 at Deck 10.</p> <p style="text-align: center;">Day 3: Wednesday, 30 August 2023, Stockholm, Sweden Central European Summer Time (GMT+2): Stockholm, Social Activities</p>			

#Tentative summary schedule, may vary after final confirmation.

Summary of **Online LIVE** Sessions

Day-1: Monday, 28 August 2023 Stockholm, Sweden Central European Summer Time (GMT+2)		Day-2: Tuesday, 29 August 2023 Stockholm, Sweden Central European Summer Time (GMT+2)	
Session 01: Nanomaterials & Nanotechnology	08.00 – 10.00	Session 06: Hydrogen & Energy Application	07.00 – 09.00
Session 02: Energy Materials	10.00 – 12.00	Session 07: Thin Films, Materials Surface & Interfaces	09.00 – 11.00
Session 03: Environmental & Green Materials	12.00 – 14.00	Session 08: Functional Materials	11.00 – 14.00
Session 04: Structural & Engineering Materials	14.00 – 17.00	Session 09: Electronic, Magnetic & Optical Materials	14.00 – 16.15
Session 05: Polymer Symposium	17.00 – 18.30	Session 10: Waste Management & Green Materials	16.15 – 18.30
Day-3: Wednesday, 30 August 2023 Stockholm, Sweden Central European Summer Time (GMT+2)		Day-4: Thursday, 31 August 2023 Stockholm, Sweden Central European Summer Time (GMT+2)	
Session 11: Nanomaterials & Nanotechnology	07.00 – 10.00	Session 17: Photocatalysis and Electrocatalysis	07.00 – 08.15
Session 12: Composite & Ceramic Materials	10.00 – 11.15	Session 18: Photovoltaic & Functional Materials	08.15 – 10.15
Session 13: Batteries, Supercapacitor and Solid Electrolyte Materials	11.15 – 13.15	Session 19: Nanomaterials & Nanotechnology	10.15 – 12.00
Session 14: Computational Materials & Modelling	13.15 – 15.00	Session 20: Drug Delivery & Formulation	12.00 – 13.00
Session 15: Biomaterials & Biodevices	15.00 – 17.00	Symposium Energy Materials & Technology Session 21: Batteries, Supercapacitors and Solid Electrolyte Session 22: Energy Materials: Synthesis & Characterization Session 23: Energy Materials & Technology Session 24: Energy Harvesting Materials & Technology	13.00 – 19.00
Session 16: Biomaterials & Theranostic	17.00 – 19.00	Closing Ceremony (Online LIVE)	19.00 – 19.30

#Tentative summary schedule, may vary after final confirmation.

Guidelines For Onsite Delegates

Itinerary of Cruise

Date	Day	Port Description	Arival Time	Departure Time
28-08-2023	Monday	Stockholm, Sweden		15:00
29-08-2023	Tuesday	Helsinki, Finland	08:00	16:00
30-08-2023	Wednesday	Stockholm, Sweden	10:00	

1. TRAVEL GUIDELINES & INFORMATION

A. Planning your travel

- Please make sure to ready your visa before arriving. To know about visa type and other formalities, please contact embassy/consulate in your country of residence.
- The check-in will be held at Terminalen Stadsgården, 116 30 Stockholm on 28 August 2023 from 09.00 – 10.00 AM.

- If you are arriving in Stockholm, one-day before (27 August 2023), you may prefer to stay in a hotel, near the port. All passengers must follow national and international guidelines issued during visit time by host countries.

B. Checklist during embarkation

For a seamless embarkation process, please make sure to bring: Valid identity documents (Passport, visa etc.).

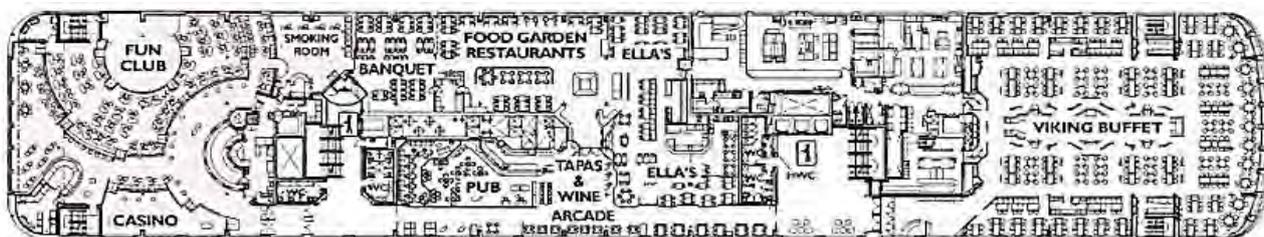
2. CONGRESS VENUE



Café/Club

Conference

Deck 10, Conference Center



Fun Club (Night Club) & Casino

Food Garden Classical
Ella's
Tapas & Wine
Captain's Corner Pub & Banquet

Viking Buffet

Deck 8, The Buffet

To know about the venue of the congress, please visit:

www.advancedmaterialscongress.org/baltic-spring/pages/location



Guidelines and Important Information

Onsite

A. Hybrid congress setups

The congress will be organized with an **Onsite - Online LIVE** and On-demand hybrid set up. Internet facility available at conference venue. Delegates may get free WiFi connection at venue.

B. General guidelines for lectures and presentations

There will be several types of contributions:

- **Keynote Talk:** Presentation Time - 30 minutes; 25 minutes for the presentation followed by 05 minutes' question-answer session.
- **Advanced Materials Lecture:** 20 minutes; 17 minutes for the presentation followed by 03 minutes' question-answer session. This includes the IAAM Fellow, Award and Medal lectures.
- **Invited Talk:** Presentation Time - 20 minutes; 17 minutes for the presentation followed by 03 minutes' question-answer session.
- **Oral Presentation:** Presentation Time - 15 minutes; 13 minutes for the presentation followed by 02 minutes' question-answer session.
- **Poster Presentation:** There will be separate onsite session for the poster presenters, where they will discuss their work to the audience and poster jury.

C. Special guidelines for onsite delegates

Please follow the below guidelines for attending the onsite congress.

- The onsite conference will run as per the **Central European Summer time (CEST) (GMT+2)**.
- **The delegates must wear their Name Batch (which you will get during the congress registration) and Face Mask** all the time during the conference.
- Timing of all meals (**Breakfast, Lunch and Dinner**) will be communicated onboard and may vary from day to day pending on time in ports. Normal times for breakfast are 07:30 - 08:30, lunch 13:00 - 14:00 and dinner 19:30 or 20:30.
- **Coffee and water on tap** (to have in glass does not bottle) are served in the buffet during the opening hours. Soft drinks and coffee can be purchased in all bars onboard.
- **In onsite sessions at Day – 2** (29 August 2023) congress will run with Finland time zone (GMT +3).
- For **disembarkation at Day – 3**, after the congress, time and procedure will be communicated to you onboard.

Online LIVE

A. Hybrid congress setups

The congress will be organized with an **Onsite - Online LIVE** and On demand hybrid set up. Internet facility available at congress venue. Delegates may get free WiFi connection at venue.

B. General guidelines for lectures and presentations

There will be several types of contributions:

- **Keynote Talk:** Presentation Time - 30 minutes; 25 minutes for the presentation followed by 05 minutes' question-answer session.
- **Advanced Materials Lecture:** 20 minutes; 15 minutes for the presentation followed by 05 minutes' question-answer session. This includes the IAAM Fellow, Award and Medal lectures.
- **Invited Talk:** Presentation Time - 20 minutes; 15 minutes for the presentation followed by 05 minutes' question-answer session.
- **Oral Presentation:** Presentation Time - 15 minutes; 13 minutes for the presentation followed by 02 minutes' question-answer session.
- **Poster Presentation:** There will be separate online session for the poster presenters (Presentation Time - 05 minutes), where they will discuss their work with the audience and poster jury.

C. Information for presentations

1. ONLINE LIVE GUIDELINES

All the lectures of the congress will be recorded for publication in the open access audio video literature, Video Proceedings of Advanced Materials after the proof correction. For the broader audience, IAAM circulates the open access video article to leading researchers and members of association with its monthly newsletter.

2. **Please arrange stable and strong network:** Stable and strong WiFi connection ensures fast sharing of PPT slides, running video and audio quality and the whole presentation during the session.

3. Please follow below guidelines:

- Participation in the congress should be active and mandatory.
- All the speakers should join the meeting 30 minutes in advance to the session.
- All the speakers can invite their fellow colleague and lab researchers in their presentation.

CONGRESS SPEAKERS



Orlando Auciello
University of Texas at
Dallas, USA



Patricia Horcajada
IMDEA Energy Institute
Spain



Donald Ingber
Wyss Institute for
Biologically Inspired
Engineering at Harvard
University, USA



Kamal Youcef-Toumi
Massachusetts Institute
of Technology,
Cambridge, USA



Carlo Burkhardt
Pforzheim University
Germany



Eun-Bum Cho
Seoul National
University of Science
and Technology
Republic of Korea



Tatiana Itina
CNRS
University Jean Monnet
France



Min Li
University of Oklahoma
Health Sciences Center
USA



Yuri Ribakov
Ariel University
Israel



Roman Surmenev
Tomsk Polytechnic
University
Russian Federation



Jinfeng Kang
Peking University
China



Jae Sung Lee
Ulsan National Institute of
Science and Technology
Republic of Korea



Cherng-Yuan Lin
National Taiwan Ocean
University
Taiwan



Kenji Suzuki
Tokyo Institute of
Technology
Japan



Amr Abdel-Fattah
Saudi Aramco
Saudi Arab



Marco Costantini
Institute of Physical
Chemistry – PAS, Poland



Mohamed Shahin
Curtin University
Australia



Qingyuan Wang
Chengdu University
China



Aihua-Zhang
Hainan Medical
University China



Yuji Noguchi
Kumamoto University
Japan



Zhongwei Guan
Technology Innovation
Institute
UAE



Bing-Jie Ni
University of
Technology Sydney
Australia



Jun Akedo
National Institute of
Advanced Industrial
Science & Technology
Japan



Wensu Chen
Curtin University
Australia



Zhenhai Xia
University of
New South Wales
Australia



Martin Schmal
Federal University of
Rio de Janeiro
Brazil



Hicham Hamoudi
Hamad Bin Khalifa
University
Qatar



Qiang Sun
Peking University
China



Lelei Dai
University of Minnesota
USA



Valery Levitas
Iowa State University
USA



Yujie Xiong
University of Science
and Technology of
China, China



Deen Sun
Southwest University
China



Chuanbao Cao
Beijing Institute of
Technology, China



Leonardo Fraceto
Sao Paulo State
University, Brazil



Hari Nakshatri
Indiana University
School of Medicine
USA



Li Zhang
The Chinese University
of Hong Kong, Hong
Kong



Hailong Li
Central South University
China



Protima Rauwel
Estonian University of
Life Sciences
Estonia



Sheng-Yuan
Chu-National Cheng
Kung University
Taiwan



Racid Masrou
Sidi Mohamed Ben
Abdellah University
Morocco



Shin Aoki
Tokyo University of
Science, Japan



Andrea Lucotti
Polit de Milano
Italy



Zhongchang Wang
International Iberian
Nanotechnology
Laboratory, Portugal



Daniel Pasquini
Federal University of
Uberlandia, Brazil



Zongkui Kou
Wuhan University of
Technology, China



Stefaan Decoutere
Interuniversity
Microelectronics
Centre, IMEC, Belgium



Claudia Riccardi
University of Milano
Bicocca
Italy



Ecaterina Andronescu
University Politehnica of
Bucharest
Romania



Weijun Ke
Wuhan University
China



Chol-Jun Yu
Kim Il Sung University,
DPR Korea

Session Chairs(s)

Day - 1: Monday, 28 August 2023

ONSITE

Session 1: Functional Materials

Kamal Youcef-Toumi

Massachusetts Institute of Technology, Cambridge
USA

Qingyuan Wang

Chengdu University, China

Session 2: Hydrogen Energy & Battery

Jae Sung Lee

Ulsan National Institute of Science and Technology,
Republic of Korea

Federico Tasca

University of Santiago of Chile, Chile

Session 3: Nanomaterials & Nanotechnology

Marco Costantini

Institute of Physical Chemistry - PAS, Poland

Xuanhui Qu

University of Science and Technology Beijing, China

Session 4: Structural & Engineering Materials

Mohamed Shahin

Curtin University, Australia

Daniel Pasquini

Federal University of Uberlandia, Brazil

Session 5: Electronic, Magnetic & Optical Materials

Patricia Horcajada

IMDEA Energy Institute, Spain

Qihua Wang

Lanzhou Institute of Chemical Physics (LICP), China

Session 6: Functional Materials

Lokman Uzun

Hacettepe University, Turkiye

Jianfeng Zang, Huazhong University of Science and
Technology, China

Session 7: Environmental & Sustainable Symposium

Kenji Suzuki

Tokyo Institute of Technology, Japan

Akhilesh Mishra

DST, Ministry of Science & Technology, India

Session 8: Poster Session

Vishnu Shanker

National Institute of Technology Warangal, India

Eun-Bum Cho

Seoul National University, Republic of Korea

ONLINE (LIVE)

Session 1: Nanomaterials & Nanotechnology

Tatiana Itina

CNRS, University Jean Monnet, France

Ecaterina Andronesco

University Politehnica of Bucharest, Romania

Session 2: Energy Materials

Jintao Zhang

Shandong University, China

Qiang Sun

Peking University, China

Session 3: Environmental & Green Materials

Bing-Jie Ni

University of Technology Sydney, Australia

Hailong Li

Central South University, China

Session 4: Structural & Engineering Materials

Chao Xu

Harbin Institute of Technology, China

Wensu Chen

Curtin University, Australia

Yue Li

Tsinghua University, China

Session 5: Polymer Symposium

Jun Liu

Jiangsu University, China

Chenxiao Jiang

University of Science and Technology of China, China

Day - 2: Tuesday, 29 August 2023

ONSITE

Session 9: Polymer Symposium

Leonard Francis

International Iberian Nanotechnology Laboratory,
Portugal

Ting Zhang

SINANO, Chinese Academy of Sciences, China

Session 10: Biomaterials & Biodevices

Orlando Auciello

University of Texas at Dallas, USA

Tingmei Wang

Lanzhou Institute of Chemical Physics, China

Session 11: Structural & Engineering Materials

Yuri Ribakov

Ariel University, Israel

Hicham Hamoudi

Hamad Bin Khalifa University, Qatar

Session 12: Battery & Supercapacitor Technology

Bolong Huang

The Hong Kong Polytechnic University, Hong Kong

Chuanbao Cao

Beijing Institute of Technology, China

Session 13: Computational Materials & Modelling

Marcin Kozlowski

Silesian University of Technology, Poland

Niall English

University College Dublin, Ireland

Session 14: Thin Films, Materials Surface & Interfaces

Racid Masrou

Sidi Mohamed Ben Abdellah University, Morocco

Jinfeng Kang

Peking University, China

Session 15: Environment & Sustainability Symposium

Claudia Riccardi

University of Milano Bicocca, Italy

Orlando Auciello

University of Texas at Dallas, USA

Session 16: Water Research & Technology Symposium

Darren Delai Sun

Nanyang Technological University, Singapore

Vaibhav Srivastava

KTH Royal Institute of Technology, Sweden

Rong-Chang Zeng

Shandong University of Science and Technology, China

Session 17: Baltic Water Conclave

Conclave Chair

Rajendra Singh

People's World Commission on Drought and Flood
(PWCDF), Sweden

Bastiaan Mohrmann

RuFus-Rural Futures GmbH, Austria & IrriWatch,
Netherlands

ONLINE (LIVE)

Session 6: Hydrogen & Energy Application

Shengjie Peng

Nanjing University of Aeronautics and Astronautics, China

Hai-Wen Li

Hefei General Machinery Research Institute, China

Session 7: Thin Films, Materials Surface & Interfaces

Yu-Sheng Lin

Sun Yat-Sen University, China

Minghu Pan

Shaanxi Normal University, China

Session 8: Functional Materials

Zongkui Kou

Wuhan University of Technology, China

Shouhu Xuan

University of Science and Technology of China, China

Rong Zhu

Tsinghua University, China

Session 9: Electronic, Magnetic & Optical Materials

Fushan Li

Fuzhou University, China

Stefaan Decoutere

Interuniversity Microelectronics Centre (IMEC), Belgium

Session 10: Waste Management & Green Materials

Leonardo Fraceto

Sao Paulo State University, Brazil

Protima Rauwel

Estonian University of Life Sciences, Estonia

Day - 3: Saturday, 30 August 2023

ONLINE (LIVE)

Session 11: Nanomaterials & Nanotechnology

Liang Huang

Huazhong University of Science and Technology, China

Biaolin Peng

Xidian University, China

Menglu Chen

Beijing Institute of Technology, China

Session 12: Composite & Ceramic Materials

Zhongwei Guan

Technology Innovation Institute, Abu Dhabi, UAE

Yang Liu

Soochow University, China

Session 13: Batteries, Supercapacitors and Solid Electrolyte Materials

Yuming Chen

Fujian Normal University, China

Xiaona Li

Eastern Institute of Technology, China

Session 14: Computational Materials & Modelling

Weiqiao Deng

Shandong University, China

Valery Levitas

Iowa State University, USA

Session 15: Biomaterials & Biodevices

Aihua Zhang

Hainan Medical University, China

Chandra Pundir

Maharshi Dayanand University, India

Session 16: Biomaterials & Theranostic

Hari Nakshatri

Indiana University School of Medicine, USA

Xuechuan Hong

Tibet University, China

Day - 4: Sunday, 31 August 2023

ONLINE (LIVE)

Session 17: Photocatalysis and Electrocatalysis

Songping Zhang

Chinese Academy of Sciences, China

Xibao Li

Nanchang Hangkong University, China

Session 18: Photovoltaics & Functional Materials

Li Zhang

The Chinese University of Hong Kong, Hong Kong

Shin Aoki

Tokyo University of Science, Japan

Session 19: Nanomaterials & Nanotechnology

Zhiyu Hu

Shanghai Jiao Tong University, China

Baosen Shi

University of Science and Technology of China, China

Session 20: Drug Delivery & Formulation

Min Li

University of Oklahoma Health Sciences Center, USA

Dongfei Liu

China Pharmaceutical University, China

Session 21: Batteries, Supercapacitors and Solid Electrolyte

Weifeng Wei

Central South University, China

Hao Jiang

East China University of Science and Technology, China

Session 22: Energy Materials: Synthesis & Characterization

Wenge Yang

HPSTAR, China

Cun Zhang

China University of Mining and Technology, China

Session 23: Energy Materials & Technology

De-Yi Wang

IMDEA Materials Institute, Spain

Martin Schmal

Federal University of Rio de Janeiro, Brazil

Session 24: Energy Harvesting Materials & Technology

Qifa Zhou

University of Southern California, USA

Weijun Ke

Wuhan University, China

SYMPOSIUM SESSIONS ONSITE

Session 7 and 15: Environment & Sustainability

Session 9: Polymer

Session 16: Water Research & Technology

SYMPOSIUM SESSIONS ONLINE (LIVE)

Session 2, 6, 13, 20- 24: Energy Materials & Technology

Session 3 and 10: Environment & Sustainability



Advanced Materials Congress

28 - 31 August 2023 | Stockholm, Sweden

Fellow Summit
Baltic Conference Series

Advanced Energy Materials &
Technology Congress



SCIENTIFIC PROGRAM

Online **LIVE** Sessions (01 – 24)

Onsite Sessions (01 – 16)

Onsite Venue - M/S Gabriela, Viking Line

Day - 1: Monday, 28 August 2023

Onsite Time Zone: Stockholm, Sweden, Central European Summer Time (CEST, GMT+2)

Online Time Zone: Stockholm, Sweden, Central European Summer Time (CEST, GMT+2)

- 07.45-08.00 **Opening of Online Congress (Online LIVE)**
- 08.00-18.30 **Online **LIVE** Sessions (1 to 5)**
- 09.30-10.30** **Registration (Onsite)** at Viking Line Terminal, Stadsgården, 11630 Stockholm, Sweden
- 10.30-11.00** **Check-in & Boarding (Onsite)** to M/S Gabriella, Viking Line Cruise and Drop Luggage at Conference Auditorium, Deck 10, Conference Centre

Day - 1: Monday, 28 August 2023

Congress Time Zone: Central European Summer Time (GMT+2)

Opening Ceremony & Onsite Sessions

Onsite Venue - Conference Centre, Deck 10, M/S Gabriella

- 11.00-11.15** **Welcome Message from Organizer: Ashutosh Tiwari**, Secretary General, International Association of Advanced Materials; and Director, Institute of Advanced Materials, IAAM, Sweden

11.15-13.00

Onsite Session 01: Functional Materials

Room 1: Auditorium B

Session Chair(s): Kamal Youcef-Toumi, Massachusetts Institute of Technology, Cambridge, USA and **Qingyuan Wang**, Chengdu University, China

- 11.15-11.45** **Keynote Lecture: Orlando Auciello**, *Materials Science/Technologies Development of Transformational Multifunctional Films for New Generations of Industrial, High-Tech, and Biomedical Devices/Prostheses to Improve Way/Quality of Life*, University of Texas at Dallas, USA
- 11.45-12.15** **Keynote Lecture: Qingyuan Wang**, *In-situ Photomicroscope and Dissipative Investigation of Short Crack Propagation under Ultrasonic Fatigue Test*, Chengdu University, China
- 12.15-12.45** **Keynote Lecture: Jae Sung Lee**, *Solar Hydrogen Production at Scale by Water Splitting*, Ulsan National Institute of Science and Technology, Republic of Korea

28 August 2023

	12.45-13.05	Advanced Materials Lecture: Patricia Horcajada, <i>Metal-Organic Frameworks as Multifunctional Materials</i> , IMDEA Energy Institute, Spain
	13.00-14.00	Lunch, The Buffet, Deck 8
	14.00-15.00	Cabin Access and Poster Setup
28 August 2023	15.00-16.45	Onsite Session 02: Hydrogen Energy & Battery
		Room 1
		Session Chair(s): Jae Sung Lee , Ulsan National Institute of Science and Technology, Republic of Korea and Federico Tasca , University of Santiago of Chile, Chile
	15.00-15.20	Advanced Materials Lecture: Bolong Huang, <i>Advanced Atomic Catalysts Design for Energy Systems</i> , The Hong Kong Polytechnic University, Hong Kong
	15.20-15.40	Advanced Materials Lecture: Yan-Gu Lin, <i>Structure-dynamics Investigation of Energy Materials by X-ray Spectroscopy</i> , National Synchrotron Radiation Research Center, Taiwan
	15.40-16.00	Invited Lecture: Ling Xu, <i>Study on Photovoltaic and Thermoelectric Properties of Organic-Inorganic Composite Perovskite Solar Cells</i> , Huazhong University of Science and Technology, China
	16.00-16.20	Advanced Materials Lecture: Rachid Masrour, <i>An Ab Initio Calculations of LiFePO₄, LiCoBO₃ and LiVOPO₄ as Li-ion Battery Cathode Materials</i> , Sidi Mohamed Ben Abdellah University, Morocco
16.20-16.40	Advanced Materials Lecture: Alessandra Palella, <i>High Performance Catalytic Materials for E-fuels Manufacturing</i> , CNR-ITAE, Italy	
28 August 2023	15.00-16.45	Onsite Session 03: Nanomaterials & Nanotechnology
		Room 2
		Session Chair(s): Marco Costantini , Institute of Physical Chemistry - PAS, Poland and Xuanhui Qu , University of Science and Technology Beijing, China
	15.00-15.20	Advanced Materials Lecture: Lokman Uzun, <i>Interface Imprinting Approach as a New Technique to Develop Selective and Sensitive Materials</i> , Hacettepe University, Turkiye
	15.20-15.40	Advanced Materials Lecture: Xiongwu Kang, <i>Polyhedron-Shaped High-Entropy-Alloy Catalysts towards Multifunctional Electrocatalysis</i> , South China University of Technology, China
	15.40-16.00	Advanced Materials Lecture: Hicham Hamoudi, <i>Moving Beyond Molecular Self-Assembled Monolayers: Achieving Direct Additive Manufacturing through Self-Assembly of Individual Molecules</i> , Hamad Bin Khalifa University, Qatar
	16.00-16.20	Advanced Materials Lecture: Yang Luo, <i>Defect Engineering to Tailor Metal Vacancies in 2D Conductive Metal-Organic Frameworks</i> , ETH Zurich/Hong Kong Productivity Council, Hong Kong
16.20-16.35	Oral: Jing Zhang, <i>Nano-architecture Composed of Oriented Nanoalloy@CNTs Bio-microchips for Nonintrusive and Onsite Salivary Diagnosis of Periodontosis</i> , Nanjing Tech University, China	
16.35-16.45	Session Discussion	

15.00-16.45

Onsite Session 04: Structural & Engineering Materials

Room 1

Session Chair(s): Mohamed Shahin, Curtin University, Australia and Daniel Pasquini, Federal University of Uberlandia, Brazil

- 15.00-15.20 **Advanced Materials Lecture:** Yuri Ribakov, *Using Mathematical Models for Optimal Design of Self-Compacting Concrete Composition*, Ariel University, Israel
- 15.20-15.40 **Advanced Materials Lecture:** Yongmao Pei, *Holographic Acoustic Vortices based on Spin Density*, Peking University, China
- 15.40-16.00 **Advanced Materials Lecture:** Bing Li, *Extraordinary Elastic-Wave Manipulations based on Metamaterial and Metasurface*, Northwestern Polytechnical University, China
- 16.00-16.20 **Advanced Materials Lecture:** Marcin Kozłowski, *Innovative Solution for Improved Post-breakage Safety of Point-fixed Laminated Glass*, Silesian University of Technology, Poland
- 16.20-16.40 **Advanced Materials Lecture:** Jamiru Tamba, *Phase Transformation and Characterization - Vehicles of Innovation in the Development Advanced Materials*, Tshwane University of Technology, South Africa
- 16.40-16.45 Session Discussion
- 16.45-17.00 **Coffee Break at Conference Center, Deck 10 and Poster Setup**

28 August 2023

17.00-18.30

Onsite Session 05: Electronic, Magnetic & Optical Materials

Room 2

Session Chair(s): Patricia Horcajada, IMDEA Energy Institute, Spain and Qihua Wang, Lanzhou Institute of Chemical Physics (LICP), China

- 17.00-17.20 **Advanced Materials Lecture:** Chuanbao Cao, *Tuning Surface Electronic Structure of Two-Dimensional Nanosheets through Surface Treatments for Highly Efficient Water Oxidation*, Beijing Institute of Technology, China
- 17.20-17.40 **Advanced Materials Lecture:** Jinfeng Kang, *Correlations between Physical Effects and Oxygen Vacancy Natures in HfO₂-based Thin Films*, Peking University, China
- 17.40-18.00 **Advanced Materials Lecture:** Guanjun Xiao, *Pressure-Induced Emission (PIE)*, Jilin University, China
- 18.00-18.20 **Advanced Materials Lecture:** Lung-Chien Chen, *Study of CsPbBr₃ Perovskite Light-Emitting Diodes using MAPbBr₃ Single Crystal Source*, National Taipei University of Technology, Taiwan
- 18.20-18.35 **Oral:** Pravin Kumar Singh, *Prognosticating Crystallization Kinetics in Active Pharmaceutical Ingredients*, Institute of Advanced Materials, IAAM, Sweden

28 August 2023

17.00-18.30

Onsite Session 06: Functional Materials

Room 1

Session Chair(s): Lokman Uzun, Hacettepe University, Turkiye and Jianfeng Zang, Huazhong University of Science and Technology, China

- 17.00-17.20 **Advanced Materials Lecture:** Claudia Riccardi, *Deposition of Metal Oxide Nanostructures by Supersonic Plasma Jets*, University of Milano Bicocca, Italy

	17.20-17.40	Invited Lecture: Niall English, <i>Nanobubbles - Realising the Molecular Engineering of Nanoporous Liquids</i> , University College Dublin, Ireland
	17.40-18.00	Advanced Materials Lecture: Ting Zhang, <i>Bioinspired Flexible Sensing Electronics for Smart Prosthetic Hand</i> , Suzhou Institute of Nano-Tech & Nano-Bionics (SINANO), Chinese Academy of Sciences, China
	18.00-18.15	Oral: Kranthi Kumar Madamchetty Venkata, <i>Wide Spectrum on Lifestyle Diseases - NGS Technology Advancements in the Clinical Research</i> , Usmania University, India
	18.15-18.30	Oral: Yuanshuai Ding, <i>A Novel Piezo-Driven Robot used in Endoscopic Biopsy Channels</i> , Peking University, China
28 August 2023	17.00-18.30	Onsite Session 07: Environment & Sustainability Symposium
		Room 2
		Session Chair(s): Kenji Suzuki , Tokyo Institute of Technology, Japan and Akhilesh Mishra , DST, Ministry of Science and Technology, India
	17.00-17.20	Advanced Materials Lecture: Rong-Chang Zeng, <i>Enhanced in vitro Degradation Rate on Bioresorbable Alloy by Microbial Ingress in Presence of Glucose</i> , Shandong University of Science and Technology, China
	17.20-17.40	Advanced Materials Lecture: Amr Abdel-Fattah, <i>Nanomaterials Transforming the Efficiency and Sustainability of Hydrocarbon Reservoir Applications</i> , Saudi Aramco, Saudi Arabia
	17.40-18.00	Advanced Materials Lecture: Vishnu Shanker, <i>Solar Light Irradiated Nanostructured Photocatalyst for Environmental Remediation and H₂-Generation</i> , National Institute of Technology Warangal, India
	18.00-18.20	Advanced Materials Lecture: Cher Ming Tan, <i>Importance of Material Sciences in Assuring today Products Reliability</i> , Chang Gung University, Taiwan
	18.20-18.30	Symposium Discussion
	18.30-18.45	Coffee Break at Conference Center, Deck 10
	28 August 2023	18.45-19.30
		Room 1
		Poster Jury: Eun-Bum Cho , Seoul National University, Republic of Korea and Vishnu Shanker , National Institute of Technology Warangal, India
18.45-18.50		Tingmei Wang, <i>Reconfigurable, Solvent-Processable, NIR-Triggerable Shape Memory Cyanate Esters for Smart Mold</i> , Lanzhou Institute of Chemical Physics, China
18.50-18.55		Yaoming Zhang, <i>Dynamic Hydrogen Bonding Induced Hygroscopicity of Ionogel Enabling Friction Behavior Regulation</i> , Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, China
18.55-19.00		Zenghui Yang, <i>Preparation and study of robust and tough polyurethane elastomer</i> , Lanzhou Institute of Chemical Physics, China
	19.00-19.05	Ayushi Tiwari and Md. Ashaduzzaman, <i>In situ photocatalysis of Ag/Fe₂O₃ nanocomposite for ROS mediated anti-bacterial and anti-cancer activities</i> , Medical University of Warsaw, Poland and Institute of Advanced Materials, IAAM, Sweden

- 19.05-19.10 **Christiane Helbrecht, *Influence of Fiber Orientation on the Strength Properties of Paper-Epoxy Composites***, Technical University of Darmstadt, Germany
- 19.10-19.15 **Patrick Jahn, *All-Cellulose Composite: Influence of Dissolution Time and Moisture Content of the Raw Paper on the Wet Strength and Barrier Properties***, Technical University of Darmstadt, Germany
- 19.15-21.00 **Dinner at The Buffet, Deck 8**
- 21.00-22.00 **Cultural Program, Deck 8**

Day - 2: Tuesday, 29 August 2023
Helsinki, Finland, Time Zone for Onsite: GMT+3 (Finland Time)

- 07.30-08.30 **Breakfast, at The Buffet, Deck 8**
- 07.00-18.30 **Online  Sessions (06-10)**

Onsite Venue:
Conference Auditorium, Deck 10, Conference Centre, M/S Gabriella

29 August 2023

09.00-10.45

**Onsite Session 09:
Polymer Symposium**

Room 1

Session Chair(s): Leonard Francis, International Iberian Nanotechnology Laboratory, Portugal and **Ting Zhang**, Chinese Academy of Sciences, China

- 09.00-09.20 **Advanced Materials Lecture: Marco Costantini, *Microfluidic-assisted Digital Manufacturing: Towards the Next Generation of Tissue Models***, Institute of Physical Chemistry - PAS, Poland
- 09.20-09.40 **Advanced Materials Lecture: Qihua Wang, *4D Printing of High-performance Shape memory Polymers: Design, Synthesis and Applications***, Lanzhou Institute of Chemical Physics (LICP), China
- 09.40-10.00 **Advanced Materials Lecture: Jing Wang, *Microplastics Free Plastics: Preventing Microplastic at the Source***, Trinity College Dublin, Ireland
- 10.00-10.20 **Advanced Materials Lecture: Anandakumar Srinivasan, *Development and Characterization of Single Walled Carbon Nanotubes (SWCNTs) Dispersed Water Borne Epoxy (WBEP) Coatings with Enhanced Adhesion and Corrosion Resistance***, Anna University, India
- 10.20-10.35 **Oral: Venu Prakash Kasinikota, *Development of Cyber-Physical Systems for Epoxy Resin Insulators***, Polymer Competence Center Leoben, Austria
- 10.35-10.50 **Oral: Dhanya A R, *Covalently Bonded Fe-Nx Active Sites in Carbon Matrix for Room Temperature Hydrogen Storage***, Indian Institute of Technology Madras, India

29 August 2023

09.00-11.00

Onsite Session 10: Biomaterials & Biodevices

Room 2

Session Chair(s): Orlando Auciello, University of Texas at Dallas, USA and Tingmei Wang, Lanzhou Institute of Chemical Physics, China

- 09.00-09.20 **Advanced Materials Lecture: Jianfeng Zang, *Soft Intelligent Materials for Biomedical Applications***, Huazhong University of Science and Technology, China
- 09.20-09.40 **Advanced Materials Lecture: Jingdi Chen, *Construction of Bone Repair Composite Materials by Insitu Organization of Functional Elements***, Shandong University, China
- 09.40-10.00 **Advanced Materials Lecture: Jiegang Peng, *Induced Polarization Effect in Bio-inspiration for Active Electrolocation and its Modeling***, University of Electronic Science and Technology of China, China
- 10.00-10.20 **Advanced Materials Lecture: Wanhe Wang, *Subcellular Luminescent Iridium(III) Complexes as Bioimaging Probes and Bioactive Compounds***, Northwestern Polytechnical University, China
- 10.20-10.40 **Advanced Materials Lecture: Suresh Annamalai, *Development and Characterization of Bio-based PLA-PU-Garnet Coatings towards Anti-corrosion***, Anna University, India
- 10.40-11.00 **Advanced Materials Lecture: Zhenyu Chu, *Separation-sensing Membrane for Clinical Blood Monitoring***, Nanjing Tech University, China

29 August 2023

09.00-10.45

Onsite Session 11: Structural & Engineering Materials

Room 3

Session Chair(s): Yuri Ribakov, Ariel University, Israel and Hicham Hamoudi, Hamad Bin Khalifa University, Qatar

- 09.00-09.20 **Advanced Materials Lecture: Kamal Youcef-Toumi, *Nanoscale High-Speed Imaging & Material Characterization***, Massachusetts Institute of Technology, Cambridge, USA
- 09.20-09.40 **Advanced Materials Lecture: Xuanhui Qu, *Metal Injection Molding Principle, Technique and Application***, University of Science and Technology Beijing, China
- 09.40-10.00 **Advanced Materials Lecture: Mohamed Shahin, *Bio-cementation for Ground Improvement in Civil Engineering Infrastructure Systems***, Curtin University, Australia
- 10.00-10.20 **Invited Lecture: Eun-Bum Cho, *Structural Stability of Mesoporous Ni-phyllsilicate***, Seoul National University of Science and Technology, Republic of Korea
- 10.20-10.40 **Invited Lecture: Bin Zhang, *Superlubricity of carbon films***, Lanzhou Institute of Chemical Physics, Chinese Academy of Science, China
- 10.45-11.00 **Coffee Break at Conference Center, Deck 10**

29 August 2023

11.00-12.00

Onsite Session 12: Battery & Supercapacitor Technology

Room 1

Session Chair(s): Bolong Huang, The Hong Kong Polytechnic University, Hong Kong and Chuanbao Cao, Beijing Institute of Technology, China

11.00-11.20

Advanced Materials Lecture: Federico Tasca, *Fe Phthalocyanines and Fe Penta-Coordinated Phthalocyanines for the Oxygen Reduction Reaction in Fuel Cell and Metal-air Batteries*, University of Santiago of Chile, Chile

11.20-11.40

Advanced Materials Lecture: Cherng-Yuan Lin, *Investigation on Engine Performance and Emission Characteristics of Biodiesel Produced from High Acid Oil of Soapstocks through Supercritical Methanol Transesterification*, National Taiwan Ocean University, Taiwan

11.40-12.00

Advanced Materials Lecture: Neena John, *Electrocatalysts for Energy Efficient Hydrogen Generation from Urea Electrolysis*, Centre for Nano and Soft Matter Sciences, India

29 August 2023

11.00-12.00

Onsite Session 13: Computational Materials & Modelling

Room 2

Session Chair(s): Marcin Kozlowski, Silesian University of Technology, Poland and Niall English, University College Dublin, Ireland

11.00-11.20

Advanced Materials Lecture: Kenji Suzuki, *Small-Data Deep Learning for Computer-Aided Diagnosis for Rare Diseases*, Tokyo Institute of Technology, Japan

11.20-11.40

Invited Lecture: Abdolvahab Seif, *Highly Efficient Antifouling Surface Coatings Predicted by First Principles*, University of Padova, Italy

11.40-12.00

Advanced Materials Lecture: Dawood Desai, *An Improved Methodology for Modelling and Simulation of Laser Shock Peening*, Tshwane University of Technology, South Africa

29 August 2023

11.00-12.00

Onsite Session 14: Thin Films, Materials Surface & Interfaces

Room 3

Session Chair(s): Racid Masrour, Sidi Mohamed Ben Abdellah University, Morocco and Jinfeng Kang, Peking University, China

11.00-11.20

Advanced Materials Lecture: Deen Sun, *Tribo-corrosion Behavior of Hard yet Tough Cr_{1-x}Si_xN Nanocomposite Coatings Prepared via Magnetron Sputtering*, Southwest University, China

11.20-11.40

Advanced Materials Lecture: Leonard Francis, *In situ Atomic-Scale Observations of Nucleation, Growth and Phase Transformations*, International Iberian Nanotechnology Laboratory, Portugal

	11.40-12.00	Advanced Materials Lecture: Ying-Chiao Wang, <i>Coordination Nanosheets (CONASHs) for Highly Stable Self-powered UV Photodetector</i> , National Sun Yat-sen University, Taiwan
	12.00-13.00	Lunch at The Buffet, Deck 8
	13.30-15.30	Social Activity, Sightseeing Helsinki. Meeting on Cruise Information Desk at Deck 7 at 13.15 (Onsite)
	15.30-16.00	Coffee Break at Conference Center, Deck 10
29 August 2023	16.00-17.30	Onsite Session 15: Environment & Sustainability Symposium
		Room 1: Auditorium B
		Session Chair(s): Orlando Auciello , University of Texas at Dallas, USA and Claudia Riccardi , University of Milano Bicocca, Italy
	16.00-16.30	Keynote Lecture: Ashutosh Tiwari, <i>Emergence of R&D World Links for Decentralized Facilities and International Cooperation</i> , Institute of Advanced Materials, IAAM, Sweden
	16.30-16.50	Invited Lecture: Akhilesh Mishra, <i>Science Technology and Innovation Ecosystem of India: Recent Initiatives towards Sustainable Development</i> , Department of Science & Technology, Ministry of Science & Technology, India
	16.50-17.10	Advanced Materials Lecture: Zhidan Liu, <i>Versatile Hydrochar Material beyond Energy Application</i> , China Agricultural University, China
	17.10-17.25	Assia Stiti, <i>A Novel Synthetic Route to Micellar Polymer Additives for Fuels and Lubricants</i> , Laboratoire de Chimie des Polymères Organiques (LCPO), France
29 August 2023	17.30-18.15	Onsite Session 16: Water Research & Technology Symposium
		Room 1: Auditorium B
		Session Chair(s): Rong-Chang Zeng , Shandong University of Science and Technology, China, Vaibhav Srivastava , KTH Royal Institute of Technology, Sweden and Darren Delai Sun , Nanyang Technological University, Singapore
	17.00-17.20	Advanced Materials Lecture: Daniel Pasquini, <i>Cellulose Nanofibers-based Composites for Application as Electronic Devices and for Water Treatment</i> , Federal University of Uberlandia, Brazil
	17.20-17.40	Invited Lecture: Darren Delai Sun, <i>Nano-gasification of Water and Solvents to Improve Sustainability, and Commercial Pathways</i> , Nanyang Technological University, Singapore
	17.40-18.00	Invited Lecture: Dalia Saad, <i>Microplastics Abundance, Characteristics, and Sources in Surface Water Samples from the Vaal River, South Africa</i> , Wits University, South Africa
	18.00-18.15	Oral: Tao Liu, <i>Regularized Nanomaterials based Electrochemical Biosensors for Water Pollution Monitoring</i> , Nanjing Tech University, China
	18.15-18.30	Coffee Break at Conference Center, Deck 10

18.30-19.15

Onsite Session 17: Baltic Water Conclave

Room: Auditorium B

Moderator: Ashutosh Tiwari, Institute of Advanced Materials, IAAM, Sweden

ABOUT

Baltic Water Conclave (BWC) is a comprehensive forum meant to showcase the latest trends in Climate Neutral Research, Innovations, and Technology across water. The Water Conclave calls meetings on the Baltic Sea to discuss the advancements of smart innovation and technology for clean and sustainable society. Conclave objective is to reducing risks to life, livelihoods, and ecosystems while increasing resilience through community-led nature rejuvenation. The motto of BWC is to promote "Climate Neutral R&D and Green Tech".

CONCLAVE CHAIRS



Rajendra Singh is Chairman of People's World Commission on Drought and Flood, Sweden. He is the winner of Stockholm Water Prize' 2015; an award known as "the Nobel Prize for Water". He has been honoured by Asia's most prestigious Ramon Magsaysay Award' 2001, for Community Leadership. Along with India's most prestigious Jannalal Bajaj Award' 2005. Popularly known as "Waterman of India", Dr. Singh is also involved in the restoration of all mighty and small rivers of the country.



Bastiaan Mohrmann is Founder/Director of RuFus-Rural Futures GmbH, Austria and associate of IrriWatch, a Dutch (Netherland) tech firm for remote sensing-based irrigation advisory. He is a multi-disciplinary expert in the fields of water resources management, agriculture, private sector development, finance and sustainability. After 26 years with the World Bank Group/IFC, he established RuFus-Rural Futures and involved in promoting technological/ecological innovations for greater agro-water sustainability. Mr. Mohrmann is currently leading an Indian-Dutch consortium to research the impact of agriculture on ground and surface water resources as part of Cleaning the Ganga.

CONCLAVE PANELISTS

- Panelist 1** : **Satyanarayana Bolisetty**, People's World Commission on Drought and Flood (PWCDF), Sweden
- Panelist 2** : **Daniel Pasquini**, Federal University of Uberlandia, Brazil
- Panelist 3** : **Orlando Auciello**, University of Texas at Dallas, USA
- Panelist 4** : **Patricia Horcajada**, IMDEA Energy Institute, Spain
- Panelist 5** : **Claudia Riccardi**, University of Milano Bicocca, Italy
- Panelist 6** : **Darren Delai Sun**, Nanyang Technological University, Singapore
- Panelist 7** : **Akhilesh Mishra**, DST, Ministry of Science and Technology, India
- Panelist 8** : **Dalia Saad**, Wits University, South Africa

- 19.15-19.30 **Closing Ceremony (Onsite)**
- 19.30-20.30 **Dinner (Onsite)**
- 21.00-22.30 Cultural Activities **(Onsite), Deck 8**

Day - 3: Wednesday, 30 August 2023
Stockholm, Sweden, Central European Summer Time (GMT +2)

- 07.30-08.30 **Breakfast at The Buffet, Deck 7**
- 07.00-18.30 **Online  Sessions (11-16)**
- 09.30-10.00 **Check Out from the Cabin with Luggage and Disembarkation from the Cruise (Onsite)**
- 10.30-12.00 **Social Activity in Stockholm. Meeting on Cruise Information Desk at Deck 7 at 10.00 (Onsite)**
- 12.00 **Commencement of Tour at Central Train Station, Stockholm (Onsite)**

Day - 4: Thursday, 31 August 2023
Stockholm, Sweden, Central European Summer Time (GMT +2)

- 08.00-20.00 **Online  Sessions (16-23)**
- 20.30-19.45 **Closing Ceremony (Online)**

Online  Sessions
Session Numbers: 1 – 23

Day - 1: Monday, 28 August 2023
Congress Time Zone : Central European Summer Time (GMT+2)

- 7.45-08.00 **Opening of Congress (Online LIVE)**

**08.00-10.00 Online  Session 01:
Nanomaterials & Nanotechnology**

Session Chair(s): Tatiana Itina, CNRS, University Jean Monnet, France and Ecaterina Andronescu, University Politehnica of Bucharest, Romania

- 08.00-08.20 **Advanced Materials Lecture: Tatiana Itina, *Laser-matter Interactions and Modern Nanotechnology*, Hubert Curien Laboratory, CNRS, University Jean Monnet, France**
- 08.20-08.40 **Advanced Materials Lecture: Ecaterina Andronescu, *Oxide Nanoparticles and their Medical Application*, University Politehnica of Bucharest, Romania**
- 08.40-09.00 **Advanced Materials Lecture: Andrea Lucotti, *Fiber-optic SERS Sensor with Optimized Geometry: Latest Advances*, Politecnico di Milano, Italy**
- 09.00-09.20 **Advanced Materials Lecture: Qiu Jiang, *Two-Dimensional Transition Metals Carbides (MXenes) for Energy Applications*, University of Electronic Science and Technology of China, China**
- 09.20-09.40 **Advanced Materials Lecture: Junidah Lamaming, *Nanocellulose from Oil Palm Biomass Waste as Value-added Products*, Faculty of Engineering, Universiti Malaysia Sabah, Malaysia**

28 August 2023

	09.40-10.00	Advanced Materials Lecture: Zhenhua Wu, <i>Thermal Transmission and Resistance Switching Behaviour in Sb₂Te₃-Metal Multilayers</i> , Shanghai Jiao Tong University, China
28 August 2023	10.00-12.00	Online  Session 02: Energy Materials
		Session Chair(s): Jintao Zhang, Shandong University, China and Qiang Sun, Peking University, China
	10.00-10.20	Advanced Materials Lecture: Yujie Xiong, <i>Solar-Driven Artificial Carbon Cycle</i> , University of Science and Technology of China, China
	10.20-10.40	Advanced Materials Lecture: Qiang Sun, <i>Topological Quantum Materials for the Anode and Cathode of Metal-Ion Batteries</i> , Peking University, China
	10.40-11.00	Advanced Materials Lecture: Jintao Zhang, <i>Interface Electrochemistry of Advanced Electrodes for Sustainable Energy</i> , Shandong University, China
	11.00-11.20	Advanced Materials Lecture: Jixin Zhu, <i>Lithium Batteries High-performanced Storage and Fire Safety</i> , University of Science and Technology of China, China
	11.20-11.40	Advanced Materials Lecture: Osamu Kitao, <i>Electronic Absorption Spectral Analysis of Chlorin-based Dyad Sensitizers by TD-DFT Calculations</i> , National Institute of Advanced Industrial Science and Technology, Japan
	11.40-12.00	Advanced Materials Lecture: Bing Xie, <i>Advanced Polymer Nanocomposites for Capacitive Energy Storage</i> , Nanchang Hangkong University, China
28 August 2023	12.00-14.00	Online  Session 03: Environmental & Green Materials
		Session Chair(s): Bing-Jie Ni, University of Technology Sydney, Australia and Hailong Li, Central South University, China
	12.00-12.20	Advanced Materials Lecture: Bing-Jie Ni, <i>Constructing Highly Efficient Oxygen Evolution Electrocatalysts from Waste Printed Circuit Boards with a Boriding Recycling Strategy</i> , University of Technology Sydney, Australia
	12.20-12.40	Advanced Materials Lecture: Hailong Li, <i>Immobilization of Gas-phase Mercury by Metal Sulfides/Selenides</i> , Central South University, China
	12.40-13.00	Advanced Materials Lecture: Ling-Ping Xiao, <i>Sustainable Production of Chemicals and Functional Materials toward Lignin Valorization</i> , Dalian Polytechnic University, China
	13.00-13.20	Advanced Materials Lecture: Yueliang Liu, <i>A Novel Additive to CO₂ for Improving CO₂ Utilization and Storage in Geological Body</i> , China University of Petroleum-Beijing, China
	13.20-13.40	Advanced Materials Lecture: Qiang Yang, <i>Renewable Energy Provision and Energy-Efficient Operation for Sustainable 5G Infrastructures</i> , Zhejiang University, China
	13.40-14.00	Advanced Materials Lecture: Yuanbin Zhang, <i>Design of Anion Pillared MOFs for Gas Separation</i> , Zhejiang Normal University, China

28 August 2023

14.00-17.00

Online **LIVE**  Session 04:
Structural & Engineering Materials

Session Chair(s): Chao Xu, Harbin Institute of Technology, China,
Wensu Chen, Curtin University, Australia and Yue Li, Tsinghua University, China

- 14.00-14.20 **Advanced Materials Lecture:** Chao Xu, *Dynamic Recrystallization and Aging Behaviour of Mg-RE Alloy Containing Nano Plate-shaped Phases*, Harbin Institute of Technology, China
- 14.20-14.40 **Advanced Materials Lecture:** Yue Li, *Epsilon-Near-Zero Metamaterials*, Tsinghua University, China
- 14.40-15.00 **Advanced Materials Lecture:** Wensu Chen, *Structural Applications of Lightweight Geopolymer Composites*, Curtin University, Australia
- 15.00-15.20 **Advanced Materials Lecture:** Weiwei Liu, *Large-deformation Mechanism and Controlling Method of a Large-span Tunnel in Chlorite Schist*, Chang'an University, China
- 15.20-15.40 **Advanced Materials Lecture:** Hiroyuki Yaguchi, *Development of Magnetic Vibration Actuator System for Structural Inspection using SMA Materials*, Tohoku Gakuin University, Japan
- 15.40-16.00 **Advanced Materials Lecture:** Wen Wang, *Piezoelectric Materials based Surface Acoustic Wave Propagation and Sensing Applications*, Institute of Acoustics, Chinese Academy of Sciences, China
- 16.00-16.20 **Advanced Materials Lecture:** Zhao Peng Hao, *Theory and Technology of High Quality Processing for Superalloy*, Changchun University of Technology, China
- 16.20-16.40 **Advanced Materials Lecture:** Yanqing Wang, *Vibration of Porous Shells Reinforced with Graphene Platelets*, Northeastern University, China
- 16.40-17.00 **Advanced Materials Lecture:** Shang Sui, *Laser Directed Energy Deposition of High-performance Ni-based Superalloy*, Xi'an University of Technology, China

28 August 2023

17.00-18.30

Online **LIVE**  Session 05:
Polymer Symposium

Session Chair(s): Jun Liu, Jiangsu University, China and
Chenxiao Jiang, University of Science and Technology of China, China

- 17.00-17.20 **Advanced Materials Lecture:** Jun Liu, *Engineering Nanocellulose-based Biomaterials for Biomedical Application*, Jiangsu University, China
- 17.20-17.40 **Advanced Materials Lecture:** Chenxiao Jiang, *Ion-distillation for Isolating Lithium from Lake Brine*, University of Science and Technology of China, China
- 17.40-18.00 **Advanced Materials Lecture:** Yang Liu, *New Molecular Understanding of Ferroelectric Polymer and Nanocomposites*, HUST, China
- 18.00-18.20 **Advanced Materials Lecture:** Ahmad Aqel, *Polymer-based Monoliths Modified with Micro and Nanoparticles for Capillary Liquid and Gas Chromatography Applications*, Department of Chemistry, College of Science, King Saud University, Saudi Arabia
- 18.20-18.30 Session Discussion

Day - 2: Tuesday, 29 August 2023
Stockholm, Sweden, Central European Summer Time (GMT +2)

29 August 2023

07.00-09.00

Online **LIVE** Session 06:
Hydrogen & Energy Application

Session Chair(s): Shengjie Peng, Nanjing University of Aeronautics and Astronautics, China and Hai-Wen Li, Hefei General Machinery Research Institute, China

07.00-07.20

Advanced Materials Lecture: Shengjie Peng, *Hydrogen Production from Water Splitting*, Nanjing University of Aeronautics and Astronautics, China

07.20-07.40

Advanced Materials Lecture: Hai-Wen Li, *Solid Hydrides for Multiple Energy Application*, Hefei General Machinery Research Institute, China

07.40-08.00

Advanced Materials Lecture: Jianxin Zou, *Developing Nano-structured Mg-based Composite Materials for Hydrogen Storage*, Shanghai Jiao Tong University, China

08.00-08.20

Advanced Materials Lecture: Hanfeng Liang, *Electrocatalytic Synthesis of Hydrogen and Ammonia Fuels*, Xiamen University, China

08.20-08.40

Advanced Materials Lecture: Zhen-Yu Tian, *Catalytic Ordered Transformation: Synthesis, Characterizations, and Applications for Sustainable Energy and Green Chemistry*, Institute of Engineering Thermophysics, Chinese Academy of Sciences, China

08.40-09.00

Advanced Materials Lecture: Wanchun Guo, *Nitrogen-doped Carbon Materials: Unprecedented 100% Conversion from Pyridinic to Pyrrolic Nitrogen Configuration*, Yanshan University, China

29 August 2023

09.00-11.00

Online **LIVE** Session 07:
Thin Films, Materials Surface & Interfaces

Session Chair(s): Yu-Sheng Lin, Sun Yat-Sen University, China and Minghu Pan, Shaanxi Normal University, China

09.00-09.20

Advanced Materials Lecture: Yu-Sheng Lin, *Reconfigurable and Tunable Metadevices*, School of Electronics and Information Technology, Sun Yat-Sen University, China

09.20-09.40

Advanced Materials Lecture: Minghu Pan, *Synthesis and In-situ High Resolution Characterization of Two-dimensional Topological and Superconductive Materials*, Shaanxi Normal University, China

09.40-10.00

Advanced Materials Lecture: Junying Wang, *Graphene-based Catalytic or Multi-functional Materials via Interface Engineering*, Institute of coal chemistry, CAS, China

10.00-10.20

Advanced Materials Lecture: Lunyong Zhang, *Emergent Magnetic & Electronic Materials towards Novel Physics at Interface*, Harbin Institute of Technology, China

10.20-10.40

Advanced Materials Lecture: Xu Hou, *Liquid-based Materials*, Xiamen University, China

10.40-11.00

Advanced Materials Lecture: Zhigang Yin, *Thin-film Materials for Optoelectronic Devices*, Chongqing University, China

11.00-14.00

Online **LIVE** Session 08: Functional Materials

Session Chair(s): Zongkui Kou, Wuhan University of Technology, China, Shouhu Xuan, University of Science and Technology of China, China and Rong Zhu, Tsinghua University, China

11.00-11.20

Advanced Materials Lecture: Zongkui Kou, *Bringing Atomic-Level Materials Insights into Energy Electrocatalysis*, Wuhan University of Technology, China

11.20-11.40

Advanced Materials Lecture: Shouhu Xuan, *Multifunctional Polyborosiloxane Nanocomposites with Excellent Energy Absorbing and Force-Sensing Performance*, Department of Modern Mechanics, University of Science and Technology of China, China

11.40-12.00

Advanced Materials Lecture: Jun Yang, *Acoustic Metafluid for Independent Manipulation of the Mass Density and Bulk Modulus*, University of Chinese Academy of Sciences, China

12.00-12.20

Advanced Materials Lecture: Zhengping Fang, *Synchronous Flame Retarding and Smoke Suppressing on Epoxy Resin*, NingboTech University, China

12.20-12.40

Advanced Materials Lecture: Rong Zhu, *Thermosensation-based Multifunction Sensors and Electronic Skins*, Tsinghua University, China

12.40-13.00

Advanced Materials Lecture: Jiong Zhou, *Functional Supramolecular Assembly Materials Based on Macrocycles*, Northeastern University, China

13.00-13.20

Advanced Materials Lecture: Zhenhai Xia, *Biomimetic Design of Smart Materials with Switchable Adhesion*, University of New South Wales, Australia

13.20-13.40

Advanced Materials Lecture: Yue Zhao, *Structure and Flux Pinning of EuBaCu-nano-composite Films Deposited by Ultra-fast Pulse Laser Deposition Technique*, Shanghai Jiao Tong University, China

13.40-14.00

Advanced Materials Lecture: Wenbo Peng, *Advanced ZnO Based Piezo-Phototronic Optoelectronics*, Xi'an Jiaotong University, China

14.00-16.15

Online **LIVE** Session 09: Electronic, Magnetic & Optical Materials

Session Chair(s): Stefaan Decoutere, Interuniversity Microelectronics Centre, IMEC, Belgium and Fushan Li, Fuzhou University, China

14.00-14.20

Advanced Materials Lecture: Fushan Li, *Printing Quantum Dot Micro/Nano Display Technology*, Fuzhou University, China

14.20-14.40

Advanced Materials Lecture: Stefaan Decoutere, *Challenges in GaN lateral, vertical and bi-directional switches*, Interuniversity Microelectronics Centre, IMEC, Belgium

14.40-15.00

Advanced Materials Lecture: Guangcun Shan, *Accelerated Design for Magnetic High Entropy Alloys using Data-driven Multi-objective Optimization*, Beihang University, China

15.00-15.20

Advanced Materials Lecture: Ming Zheng, *Nonvolatile Magnetoelectric Effects in Multiferroics*, China University of Mining and Technology, China

15.20-15.40

Advanced Materials Lecture: Ke Wang, *Ultrathin Ferrimagnetic Rare-earth Transition Metal (RE-TM) Alloy Films and the Perpendicular Exchange Coupling Properties*, East China University of Technology, China

	15.40-16.00	Advanced Materials Lecture: Kesong Tian, <i>2D FeOCl: A Highly In-Plane Anisotropic Antiferromagnetic Semiconductor Synthesized via Temperature-Oscillation Chemical Vapor Transport</i> , Yanshan University, China
	16.00-16.20	Advanced Materials Lecture: Zhongchang Wang, <i>Atomic Structures and 1D Atomic Chains Formation in 2D In-Se Materials</i> , International Iberian Nanotechnology Laboratory, Portugal
29 August 2023	16.15-18.30	Online  Session 10: Waste Management & Green Materials
		Session Chair(s): Leonardo Fraceto , Sao Paulo State University, Brazil and Protima Rauwel , Estonian University of Life Sciences, Estonia
	16.20-16.40	Advanced Materials Lecture: Yongchao Liang, <i>Silicon-based Material: A Magical Panacea for Remediating Stressed Plants and Contaminated Environments</i> , College of Environmental and Resource Sciences, Zhejiang University, China
	16.40-17.00	Advanced Materials Lecture: Hairui Yang, <i>Exploring Fundamental Scientific Issues in Utilizing Carbide Slag from Solid Waste for Heat Storage</i> , Tsinghua University, China
	17.00-17.20	Advanced Materials Lecture: Leonardo Fraceto, <i>Nanotechnology and Active Ingredients towards Sustainable Agriculture</i> , Sao Paulo State University, Brazil
	17.20-17.40	Advanced Materials Lecture: Protima Rauwel, <i>The Dominance of Surface Defects of Nanomaterials towards their Applicability in Energy and Environmental Applications</i> , Estonian University of Life Sciences, Estonia
	17.40-18.00	Advanced Materials Lecture: Leilei Dai, <i>Pyrolysis Technology for Low Carbon and Sustainable Solid Waste Utilization</i> , University of Minnesota, USA
	18.00-18.20	Advanced Materials Lecture: Sameh Osman, <i>Benign-by-design Mechanochemical Preparation of Nanomaterials from Biomass/waste</i> , King Saud University, Saudi Arabia
	18.20-18.30	Session Discussion
		Day - 3: Wednesday, 30 August 2023 Stockholm, Sweden, Central European Summer Time (GMT +2)
30 August 2023	07.00-10.00	Online  Session 11: Nanomaterials & Nanotechnology
		Session Chair: Liang Huang , Huazhong University of Science and Technology, China, Biaolin Peng , Xidian University, China and Menglu Chen , Beijing Institute of Technology, China
	07.00-07.20	Advanced Materials Lecture: Liang Huang, <i>Salt-Assisted Synthesis of Two-Dimensional Materials</i> , Huazhong University of Science and Technology, China
	07.20-07.40	Advanced Materials Lecture: Sheng-Yuan Chu, <i>Mg Doping Effects on the Microstructure and Piezoelectric Characteristics of ZnO:Li Films Deposited at Room Temperature for MEMS Piezoelectric Accelerometer Applications</i> , National Cheng Kung University, Taiwan

- 07.40-08.00 **Advanced Materials Lecture: Biaolin Peng, *B-site Nanoscale-ordered Structure Enables Ultra-high Tunable Performance***, Xidian University, China
- 08.00-08.20 **Advanced Materials Lecture: Azaam Aziz, *Medical Imaging of Microrobots in Deep Tissue***, Leibniz-IFW Dresden, Germany
- 08.20-08.40 **Advanced Materials Lecture: Jun Yi, *Liquid Phase Nano-IR Spectroscopy for Surface Analysis of Materials in Aqueous Environments***, Xiamen University, China
- 08.40-09.00 **Advanced Materials Lecture: Menglu Chen, *High-Operating-Temperature Infrared Photodetectors via Quantum Dot Gradient Homo Junction***, Beijing Institute of Technology, China
- 09.00-09.20 **Advanced Materials Lecture: Shuai Zhang, *Simultaneously Harvesting Energy from the Sun and Cold Space for Power Generation***, Shanghai Jiao Tong University, China
- 09.20-09.40 **Advanced Materials Lecture: Zekun Liu, *Recognitions of Colored Fabrics/Laser-patterned Metals based on Photo-thermo-electric Effects***, Shanghai Jiao Tong University, China
- 09.40-10.00 **Advanced Materials Lecture: Hui Zhao, *The Breakup and Atomization of Shear Thickening Suspension***, East China University of Science and Technology, China

30 August 2023

10.00-11.15

**Online  Session 12:
Composite & Ceramic Materials**

Session Chair: Zhongwei Guan, Technology Innovation Institute, Abu Dhabi, UAE and **Yang Liu**, Soochow University, China

10.00-10.20

Advanced Materials Lecture: Yang Liu, *The Photoelectrochemical Properties and Applications of Carbon Dots Composite Materials*, Soochow University, China

10.20-10.40

Advanced Materials Lecture: Zhongwei Guan, *Structural behaviour of PVC Foam-based Sandwich Structures*, Technology Innovation Institute, Abu Dhabi, UAE

10.40-11.00

Advanced Materials Lecture: Chunlei Wan, *Fracture Toughness Enhancement of Ceramics by Embedding Two-dimensional Graphene Array and Introducing Ultra-dense Dislocations*, School of Materials Science and Engineering, Tsinghua University, China

11.00-11.20

Advanced Materials Lecture: Jianfu Zhang, *Silica Aerogel Composites: Cutting Mechanism, Characteristic and Technology*, Tsinghua University, China

30 August 2023

11.15-13.15

**Online  Session 13:
Batteries, Supercapacitors & Solid Electrolyte Materials**

Session Chair(s): Yuming Chen, Fujian Normal University, China and **Xiaona Li**, Eastern Institute of Technology, China

11.20-11.40

Advanced Materials Lecture: Yuming Chen, *Electrospinning-Based Strategies for Battery Materials*, Fujian Normal University, China

- 11.40-12.00 **Advanced Materials Lecture: Xiaona Li, *Advanced Chloride-based Superionic Conductors for All-Solid-State Lithium Batteries***, Eastern Institute of Technology, China
- 12.00-12.20 **Advanced Materials Lecture: Maochun Wu, *Composite Electrolytes Enabled High-performance Solid-state Lithium Batteries***, Department of Mechanical Engineering, The Hong Kong Polytechnic University, Hong Kong
- 12.20-12.40 **Advanced Materials Lecture: Longtao Ma, *High-Energy and High-Safety Zinc Batteries***, South China University of Technology, China
- 12.40-13.00 **Advanced Materials Lecture: Junjie Chen, *Synergistic Effect of LiTFSI with Li_3InCl_6 and Solvent in Composite Solid-State Electrolyte for Lithium Batteries***, The Hong Kong University of Science and Technology, Hong Kong
- 13.00-13.20 **Advanced Materials Lecture: Yu Wang, *Effect of Protonated Composition on the Conductivity of Antiperovskite Lithium Halide Solid Electrolytes $Li_{3-x}OH_xCl$*** , Hong Kong University of Science and Technology (HKUST), Hong Kong

30 August 2023

13.15-15.00

Online **LIVE**  **Session 14:
Computational Materials & Modelling**

Session Chair(s): Valery Levitas, Iowa State University, USA and
Weiqiao Deng, Shandong University, China

- 13.20-13.40 **Advanced Materials Lecture: Valery Levitas, *Coupled Severe Plasticity, Plastic Strain Induced Phase Transformations, and Nanostructure Evolution under High Pressure***, Iowa State University, USA
- 13.40-14.00 **Advanced Materials Lecture: Weiqiao Deng, *Digital-intellectual Design for Desired Materials***, Shandong University, China
- 14.00-14.20 **Advanced Materials Lecture: Moran Wang, *Gas diffusion and Effective Diffusivity through Saturated or Unsaturated Microporous Materials***, Tsinghua University, China
- 14.20-14.40 **Advanced Materials Lecture: Hezhu Shao, *The Effect of Higher-order Phonon-phonon Scattering on the Phonon Transport in Cu_2GeSe_3*** , Wenzhou University, China
- 14.40-15.00 **Advanced Materials Lecture: Tianyou Tao, *Typhoon-induced Buffeting Analysis of Long-span Bridges in the Context of Climate Change***, Southeast University, China

30 August 2023

15.00-17.00

Online **LIVE**  **Session 15:
Biomaterials & Biodevices**

Session Chair(s): Aihua Zhang, Hainan Medical University, China and Chandra Pundir, Maharshi Dayanand University, India

- 15.00-15.20 **Advanced Materials Lecture: Donald Ingber, *Bioinspired Living Materials: From Cellular Tensegrity to Human Organs-on-Chips***, Wyss Institute for Biologically Inspired Engineering at Harvard University, USA
- 15.20-15.40 **Advanced Materials Lecture: Aihua Zhang, *Multomics Reveal Efficacy and Bioactive Substances of Herbal Medicine***, Hainan Medical University, China

- 15.40-16.00 **Advanced Materials Lecture: Haobo Pan, *Dual-network Bioactive Glass for Hard/Soft Tissues Regeneration***, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences, China
- 16.00-16.20 **Advanced Materials Lecture: Chandra Pundir, *Employment of Nanoparticles in Advancement of Acetylcholine Biosensing***, Maharshi Dayanand University, India
- 16.20-16.40 **Advanced Materials Lecture: Wangze Song, *Zwitterionic Poly-photosensitizers as Carrier-free, Photosensitizer-Self-Delivery System for in Vivo Photodynamic Therapy***, Dalian University of Technology, China
- 16.40-17.00 **Advanced Materials Lecture: Guohua Qi, *Designing Smart Nanoprobes for Cell / In vivo Stress Response during Electrical Stimulation***, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, China

30 August 2023

17.00-19.00

**Online  Session 16:
Biomaterials & Theranostic**

Session Chair(s): Hari Nakshatri, Indiana University School of Medicine, USA and Xuechuan Hong, Tibet University, China

- 17.00-17.20 **Advanced Materials Lecture: Hari Nakshatri, *Modelling Cancer Studies under Physiologic Oxygen Levels***, Indiana University School of Medicine, USA
- 17.20-17.40 **Invited Lecture: Invited Lecture: Gopal C. Kundu, *Chitosan Nanoparticle-mediated RGD-targeted delivery of Raloxifene selectively suppresses Tumor Growth and Angiogenesis in Breast Cancer***, Kalinga Institute of Industrial Technology (KIIT), India
- 17.40-18.00 **Advanced Materials Lecture: Xuechuan Hong, *Small-molecule NIR-II Fluorophores for Molecular Imaging and Theranostics***, Tibet University, China
- 18.00-18.20 **Advanced Materials Lecture: Siu Hong Dexter Wong, *Nanobiomaterials for Biomedical Diagnosis, Engineering and Therapy***, The Hong Kong Polytechnic University, Hong Kong
- 18.20-18.40 **Advanced Materials Lecture: Hongbing Lu, *X-ray Excitable Nanoparticles-based Cancer Imaging and Therapy***, Air Force Medical University, China
- 18.40-19.00 Session Discussion

Day - 4: Thursday, 31 August 2023
Stockholm, Sweden, Central European Summer Time (GMT +2)

31 August 2023

07.00-08.15

**Online  Session 17:
Photocatalysis & Electrocatalysis**

Session Chair(s): Songping Zhang, Chinese Academy of Sciences, China and Xibao Li, Nanchang Hangkong University, China

- 07.00-07.20 **Advanced Materials Lecture: Songping Zhang, *Photocatalysis-Enzyme Coupled Artificial Photosynthesis Systems***, Institute of Process Engineering, Chinese Academy of Sciences, China
- 07.20-07.40 **Advanced Materials Lecture: Xibao Li, *Novel Heterojunction based on Interface and Defect Engineering and its Charge Transfer***, Nanchang Hangkong University, China

	07.40-08.00	Advanced Materials Lecture: Hiang Kwee Lee, <i>Intensifying Electromagnetic Field on Plasmonic Nanoarchitectures for Ammonia Photosynthesis</i> , Nanyang Technological University, Singapore
	08.00-08.20	Advanced Materials Lecture: Guijun Ma, <i>Photocatalytic Hydrogen Production from Water on Inorganic Semiconductors Utilizing Solar Energy</i> , ShanghaiTech University, China
31 August 2023	08.15-10.15	Online LIVE  Session 18: Photovoltaics & Functional Materials
	Session Chair(s): Li Zhang , The Chinese University of Hong Kong, Hong Kong and Shin Aoki , Tokyo University of Science, Japan	
	08.20-08.40	Advanced Materials Lecture: Carlo Burkhardt, <i>Recycling of Rare Earth Permanent Magnets: Challenges and Chances for a Circular Economy Sciences</i> , Pforzheim University, Germany
	08.40-09.00	Advanced Materials Lecture: Li Zhang, <i>Magnetic Miniature Robots for Translational Biomedicine: From Individual to Collectives</i> , The Chinese University of Hong Kong, Hong Kong
	09.00-09.20	Advanced Materials Lecture: Shin Aoki, <i>Development of New Cyclometalated Iridium(III) Complexes based on Post-complexation Functionalization for Biomedical and Material Sciences</i> , Faculty of Pharmaceutical Sciences, Tokyo University of Science, Japan
31 August 2023	09.20-09.40	Advanced Materials Lecture: Roman Surmenev, <i>The influence of the flexoelectric effect on materials properties with the emphasis on photovoltaic and related applications</i> , Tomsk Polytechnic University, Russian Federation
	09.40-10.00	Advanced Materials Lecture: Wenzhong Shen, <i>Approaches on the Fabrication, Evolution and Modulation of Functional Perovskites for Opto-electronic Applications</i> , Shanghai Jiao Tong University, China
	10.00-10.20	Advanced Materials Lecture: Lingling Hu, <i>Mere Tension Output from Spring-linkage-based Mechanical Metamaterials</i> , Sun Yat-sen University, China
	10.15-12.00	Online LIVE  Session 19: Nanomaterials & Nanotechnology
	Session Chair(s): Baosen Shi , University of Science and Technology of China, USTC, China and Zhiyu Hu , Shanghai Jiao Tong University, China	
31 August 2023	10.20-10.40	Advanced Materials Lecture: Zhiyu Hu, <i>Powerful Micro/Nano-Scale Heat Engine: Thermoelectric Converter on Chip</i> , Shanghai Jiao Tong University, China
	11.40-11.00	Advanced Materials Lecture: Baosen Shi, <i>Silicon-on-insulator based Quantum Sources and the Metasurface Enabled Quantum Edge Detection</i> , University of Science and Technology of China, USTC, China
	11.00-11.20	Advanced Materials Lecture: Zhengdong Cheng, <i>Nanoplate Liquid Crystals in External Fields</i> , Zhejiang University, China
	11.20-11.40	Advanced Materials Lecture: Shuangfei Cai, <i>Metal (Nanoparticle, Single atom)-based Nanozymes: From Structural Design to Biomedical Applications</i> , National Center for Nanoscience and Technology, China

	11.40-12.00	Advanced Materials Lecture: Jun Akedo, Room Temperature Ceramic Coating (AD Method) with RTIC Phenomenon and its Application , National Institute of Advanced Industrial Science & Technology, Japan
31 August 2023	12.00-13.00	<p style="text-align: center;">Online LIVE Session 20: Drug Delivery & Formulation</p> <p style="text-align: center;">Session Chair(s): Min Li, University of Oklahoma Health Sciences Center, USA and Dongfei Liu, China Pharmaceutical University, China</p>
	12.00-12.20	Advanced Materials Lecture: Min Li, A Regulatory Circular RNA Inhibits Tumor Growth and Ameliorates Pancreatic Cancer Cachexia via Signaling Axis , University of Oklahoma Health Sciences Center, USA
	12.20-12.40	Advanced Materials Lecture: Dongfei Liu, Advancing Particulate Formulations: Unlocking Drug Loading and Controlled Release , China Pharmaceutical University, China
	12.40-13.00	Advanced Materials Lecture: Chun-Feng Lai, Ophthalmic Drug Delivery by pH-Triggered Drug-Eluting Contact Lenses with Large-Pore Mesoporous Silica Nanoparticles , Feng Chia University, Taiwan
31 August 2023	13.00-19.00	<p style="text-align: center;">Online LIVE Symposium: Energy Materials & Technology (Session 21-24)</p>
	13.00-15.00	<p style="text-align: center;">Online LIVE Session 21: Batteries, Supercapacitors & Solid Electrolyte</p> <p style="text-align: center;">Session Chair(s): Weifeng Wei, Central South University, China and Hao Jiang, East China University of Science and Technology, China</p>
	13.00-13.20	Advanced Materials Lecture: Hao Jiang, Microstrain Engineering of Ni-rich Cathodes for Advanced Li-ion Batteries , East China University of Science and Technology, China
	13.20-13.40	Advanced Materials Lecture: Weifeng Wei, Manipulating the Surface Structure and Chemistry of Layered Oxide Cathodes for High-voltage Rechargeable Batteries , State Key Laboratory of Powder Metallurgy, Central South University, China
	13.40-14.00	Advanced Materials Lecture: Long Wan, Recycling Garnet-type Electrolyte toward Superior Performances via Deformation-driven Re-sintering Technology , Harbin Institute of Technology, China
	14.00-14.20	Invited Lecture: Chol-Jun Yu, Improving the Performance of Photovoltaic Solar Cells by Forming Iodide Perovskite 3D/2D Interfaces , Kim Il Sung University, Democratic People's Republic of Korea
	14.20-14.40	Advanced Materials Lecture: Hong Guo, Functionalized Covalent Organic Frameworks Achieve Dendrite-Free Lithium Metal Batteries , Yunnan University, China
	14.40-15.00	Advanced Materials Lecture: Xiaofei Sun, Rational Design and Advanced Manufacturing of High-performance Lithium/Sodium Batteries for High-Efficiency Energy Storage , Xi'an Jiaotong University, China

15.00-16.00

Online **LIVE** Session 22: Energy Materials: Synthesis & Characterization

Session Chair: Wenge Yang, HPSTAR, China and
Cun Zhang, China University of Mining and Technology (Beijing), China

15.00-15.20

Advanced Materials Lecture: Wenge Yang, *Pressure Driven Novel Superconductivity in Chalcogenides*, Center for High Pressure Science and Technology Advanced Research, HPSTAR, China

15.20-15.40

Advanced Materials Lecture: Cun Zhang, *Accurate Characterization Method of Pores and Various Minerals in Coal Materials based on CT Scanning*, China University of Mining and Technology (Beijing), China

15.40-16.00

Advanced Materials Lecture: Wen-jing Niu, *Research on Extreme Drought in Yangtze River under Changing Environments*, Bureau of Hydrology, Changjiang Water Resources Commission, China

16.00-17.15

Online **LIVE** Session 23: Energy Materials & Technology

Session Chair(s): De-Yi Wang, IMDEA Materials Institute, Spain and
Martin Schmal, Federal University of Rio de Janeiro, Brazil

16.00-16.20

Advanced Materials Lecture: De-Yi Wang, *New Generation Fire-Safe Energy Storage Devices*, IMDEA Materials Institute, Spain

16.20-16.40

Advanced Materials Lecture: Martin Schmal, *Reduced Graphene Oxide (rGO) as New Supports of Cobalt/Lanthanum Oxide and of Nano Copper and Palladium/Copper Catalysts Applied in the Water Gas Shift Reaction (WGS) and the Selective NO Reduction by CO*, Federal University of Rio de Janeiro, Brazil

16.40-17.00

Advanced Materials Lecture: Yuji Noguchi, *Enhanced Energy-Storage Performance of Dielectric Capacitors Utilizing Ferrorestorable Polarization*, Kumamoto University, Japan

17.00-17.20

Advanced Materials Lecture: Junhui Hu, *Ultrasound Assisted Metal-Air Batteries*, Nanjing University of Aeronautics & Astronautics, China

17.15-19.00

Online **LIVE** Session 24: Energy Harvesting Materials & Technology

Session Chair: Qifa Zhou, University of Southern California, USA and
Weijun Ke, Wuhan University, China

17.20-17.40

Advanced Materials Lecture: Qifa Zhou, *Flexible Ultrasound-induced Retinal Stimulating Piezo-arrays for Biomimetic Visual Prostheses*, University of Southern California, USA

17.40-18.00

Advanced Materials Lecture: Weijun Ke, *Efficient Halide Perovskites and their Tandem Solar Cells*, Wuhan University, China

18.00-18.20

Advanced Materials Lecture: Yong Du, *Flexible polymer-based thermoelectric composites and devices*, Shanghai Institute of Technology, China

18.20-18.40

Advanced Materials Lecture: Un-Gi Jong, *Ultralow Lattice Thermal Conductivity Induced by Strong Anharmonicity and Rattling Vibrations*, Kim Il Sung University, Democratic People's Republic of Korea

18.40-19.00

Symposium Discussion

19.00-19.30

Closing Ceremony (Online)

About Advanced Materials Congress



Advanced Materials Congress, AMC, is the flagship congress organized by the International Association of Advanced Materials. The congress was started in the year 2011 by IAAM and offers a truly comprehensive platform for students, researchers, policymakers, entrepreneurs, and professionals from academia and industry to promote multi-inter-trans-disciplinary research, innovation, and technology in the field of advanced materials. The congress is a highly renowned platform where researchers, professionals, scientists, and business giants from the materials science community around the world come together and discuss the latest trends and developments in the scientific world. Over the years, AMC has stimulated highly productive discussions and facilitated the advancement of materials to global excellence. As a result, today, AMC is one of the most prominent congress assemblies in the sphere of materials science, engineering, and technology.

The AMC organizes conferences in the following demographical and topical themes:

- **Advanced Materials Congress**
www.advancedmaterialscongress.org
- **Advancement of Materials to Sustainable and Green World**
www.iaamonline.org/advancement-of-materials-to-sustainable-and-green-world
- **The Journey of a Decade to Advancing Materials**
www.iaamonline.org/blog/the-journey-of-a-decade-to-advancing-materials
- **IAAM' Congress Organizing with 'Onsite - Online - On-demand' Hybrid Setups**
www.iaamonline.org/blog/iaam-congress-organizing-hybrid-setup
- **Advanced Materials WebCongress, AMWeb**
www.iaamonline.org/blog/advanced-materials-webcongress-amweb
- **Advanced Materials Congress Celebrating 10th Years of Establishment**
www.iaamonline.org/blog/advanced-materials-congress-celebrating-10th-years-of-establishment
- **Proceedings of American Advanced Materials Congress 2019, Orlando**
www.iaamonline.org/blog/proceedings-of-american-advanced-materials-congress-2019-orlando
- **Report of the Asian Advanced Materials Congress – 2019, Singapore**
www.iaamonline.org/blog/asian-advanced-materials-congress-2019
- **Report of the October edition of the Advanced Materials Congress 2019**
www.iaamonline.org/blog/report-of-the-october-edition-of-the-advanced-materials-congress-2019
- **Report of the 27th assembly of Advanced Materials Congress**
www.iaamonline.org/blog/report-of-the-27th-assembly-of-advanced-materials-congress
- **26th assembly of Advanced Materials Congress**
www.iaamonline.org/blog/report-of-the-26th-assembly-of-advanced-material-congress
- **Built Multi-Inter-Trans-Disciplinary Future of Functional Materials**
www.iaamonline.org/blog/built-multi-inter-trans-disciplinary-future-of-functional-materials
- **Silver Jubilee Assembly of Advanced Materials Congress**
www.iaamonline.org/blog/silver-jubilee-assembly-of-advanced-materials-congress
- **Advancement of Materials to Global Excellence in 2018**
www.iaamonline.org/blog/advancement-of-materials-to-global-excellence-in-2018
- **Interdisciplinary Thematic Congress held in November 2018**
www.iaamonline.org/blog/interdisciplinary-thematic-congress-held-in-november-2018
- **21st Assembly of Advanced Materials Congress**
www.iaamonline.org/blog/21st-assembly-of-advanced-materials-congress
- **European Advanced Materials Congress 2018**
www.iaamonline.org/blog/another-efficacious-conference-european-advanced-materials-congress-2018

Knowledge Experience at Sea™

This is a unprecedented and unique format of organizing conferences. Besides the great quality of discussions and world-class delegates, the one thing that makes IAAM events and conferences stand out is the unique format of 'Knowledge Experience at Sea'. All the IAAM events and conferences are organized on a cruise that takes the delegates on a voyage filled with scientific exploration and knowledge. By providing this unparalleled and unprecedented experience to the attendees of the events, IAAM has set a benchmark for the other organizations working in the sphere of advanced materials.



For more information, please visit at:

www.iaamonline.org/knowledge-experience-at-sea

Video Proceedings of Advanced Materials

A Peer-reviewed Open Access Video Journal Publishing the Latest Developments and Emerging Research of Advanced Materials Science, Engineering and Technology

Video Proceedings of Advanced Materials is an open access peer-reviewed video journal that publishes state-of-the-art research advancements of materials science, engineering, and technology.

The journal provides a comprehensive audio-visual overview of the multi-inter-trans disciplinary areas of advanced materials research, innovation, and technology. The primarily covered subject areas include a wide range of Materials applicable in Nanoscience and Nanotechnology, Energy and Environment, Physics, Chemistry and Biology, Health Science and Technology, Mathematical, Computer and Theoretical Modelling, Data Science, Artificial Intelligence and Machine Learning, Structural and Engineering Materials, etc.

The recorded lecture along with the abstract of the findings and biography of the presenting author will be published in the video journal after following a due peer-review process. The journal offers an effective service for open access science and technology. The editorial members and advisory board are committed to publishing high-quality scientific video articles to a broad audience and readership.

www.proceedings.iaamonline.org

Open Science Policy

To ensure a wide audience and audio-video article indexing, all the lectures and presentations delivered in the online Advanced Materials Lecture Series are recorded and published in the open access Video Journal, Video Proceedings of Advanced Materials. The responsibility to provide funding for the publication of their Open Access Audio Video Article in the Video Journal lies with the invited speaker.

Please read **Open Access Policy and the Video Article Processing Charges of journal at:**

www.proceedings.iaamonline.org/openaccess



Advanced Materials Lecture Series

High-Quality Insightful Lectures Delivered by the Best Scientific Minds



The Advanced Materials Lecture Series is an online open-ended lecture series called by the International Association of Advanced Materials (IAAM). All the lectures of the series are recorded for publication in the open access audio video literature, Video Proceedings of Advanced Materials. This lecture series is aimed at promoting open and informed discussions on issues pertaining to Advanced Materials Science, Engineering & Technology and encourage scientists to address the social aspects in their research. IAAM has a rich legacy of world-renowned high-profile scientists who have delivered talks in the Advanced Materials Lecture Series.

www.iaamonline.org/advanced-materials-lecture-series

Selection Procedure for Speakers

The International Association of Advanced Materials annually conducts a review of the latest research & development encompassing materials science, engineering, and technology using the most reputed scientific databases. The review is utilized to invite the world's top hundred scientific contributors in different fields every year to file nominations for IAAM's distinct recognitions including Fellow of IAAM, IAAM Medals, IAAM Scientist Medal, Advanced Materials Awards, etc. The scientific committee reviews the nominations and selects researchers to submit abstracts for their lectures in this open access video literature series. As per the mandatory requirement of association, the IAAM' distinct recognition lecture must be conducted within three months from the date of acceptance. The invited speakers can submit their abstracts through the speaker' portal.



www.advancedmaterialscongress.org/online/speaker/login

Nomination of IAAM Awards & Recognitions



Every year, IAAM office requests the top scientists to submit nominations with their complete CV via Member Portal or by email at patra@iaamonline.org. Based on the ranking of their scientific contribution in the field of experimental and theoretical studies of fundamental and applied interdisciplinary research in materials science, engineering, and technology, the scientific committee invites the researchers to submit abstracts under following categories:

- IAAM Medal is the highest category of medal that the association confers upon highly distinguished researchers and scientists. It is offered to eminent researchers who have already made a significant impact in the world with their research.
- IAAM Scientist Medal is another prestigious award that IAAM offers to researchers who have conducted a fair amount of research and created a professional impact in an interdisciplinary field. The association considers the work and contributions made in the decade preceding the year of the award.
- IAAM Young Scientist Medal is an honour that the association confers upon early-career researchers and professionals in the world of materials science and technology. The association shortlists the young researchers who have shown potential to conduct research of high merit.
- IAAM Award is a prestigious and coveted lecture that is delivered by selected few individuals. The IAAM recognizes worthy and deserving researchers to commend their years of hard work and perseverance. These honourable individuals are shortlisted to deliver the coveted IAAM Award Lecture. The lecture is made accessible to the scientific community as part of the Advanced Materials Lecture Series. The members of the community who deliver this lecture are also honoured with a citation.
- The IAAM Innovation Award is another lecture in this series that is delivered by scientists/researchers who have brought about some significant innovation to the sphere of advanced materials. The International Association of Advanced Materials keeps an eye out for individuals who demonstrate innovative approaches to generate path-breaking ideas and research.
- The board shortlists these researchers to deliver the prestigious IAAM Innovation Award Lecture and each researcher receives a citation.
- IAAM Sustainability/Green Awards is delivered by researchers, scientists, policymakers, organizations, and professionals who are utilizing advanced materials and related research to help build a sustainable and green future for the world. IAAM keenly shortlists individuals/organizations whose works align with IAAM's motto of 'Advancement of Materials to Sustainable and Green World 2030' and invites them to deliver this highly regarded lecture. The invitees are awarded with a citation.
- The IAAM Industrial Award is delivered by selected industry professionals/company who have worked towards the promotion of advanced materials science, engineering, and technology. The IAAM shortlists professionals from the industries that have been instrumental in the advancement of materials to global excellence. These professionals are invited to the IAAM Industrial Award Lecture and conferred with a citation.
- IAAM Young Scientist Award is presented by invited young and upcoming advanced materials researchers who have emerged as innovators to deliver this coveted lecture as a way of recognizing their effort. The shortlisting individuals are awarded with a citation. International Association of Advanced Materials has always believed in promoting and inspiring young professionals working in the sphere of advanced materials.

Award Nomination Form

www.iaamonline.org/awards-nomination

R&D World Links and Decentralized Facilities

Our world R&D decentralized initiatives are based on the belief that collaborations inspire translational innovation by enhancing new methods and technologies in materials sustainability, health, energy, and environment. With this belief, Institute of Advanced Materials has established a network of R&D labs and decentralized facilities that strengthen and facilitate interdisciplinary participation of global researchers and scientists in Translational Research & Innovation activities. The institute coordinates projects and brings together experts from diverse subject areas on these integrated experts' networks and facilities.

Aims and Objectives

Our network of decentralized facilities and R&D World Links is aimed at supporting innovative research projects and partnerships. Institute of Advanced Materials acts as the central coordinator and organizes number of consortia, experts' groups, and translational research programs for sustainable and climate neutral future. We ensure that the projects are carried out with the maximum level of interaction. We also utilize our global network of International Association of Advanced Materials to promote research and innovation programs with academic and research institutions as well as business organizations. Our primary aim is to allow the best minds from different scientific disciplines to come together on our R&D World Links and connect with their peers with the same interests and make major advancements in Translational Research and Innovations.

Networking

IAM consortia bring together network of experts, members of academia, and industry specialists.

Finding Solutions

The discussions are focused on finding solutions to the various problems of businesses and industries

Creating Collaborations

Our consortiums create the perfect environment for collaboration between different stakeholders from academia, industry, and businesses.

Intensive Discussions

IAM consortiums bring together experts from various fields and promote intensive discussions on various critical topics.

Mapping Out Future

We focus on identifying different technologies and mapping out their applications in businesses in different industries.

Generating Results

IAM consortiums are highly result-oriented and focus on improving the existing technology and adding value to businesses.



Action Plans for International R&D Links

We allow researchers with varied interests, especially the ones working for the Advancement of Materials to build a Sustainable World, to join forces and build long-term sustained partnerships through these comprehensive R&D World Links. Our decentralized facilities are part of a larger agenda with multiple action plans:

Action Plan 1. Facilitating partnerships and collaborations for actively working on Translational Research Initiatives, Joint Research Programs, Educational Activities, and Joint Supervision of Students.

Action Plan 2. Creating decentralized world-wide joint/network labs and experts.

Action Plan 3. Finding solutions to problems by providing the right network and strategies and ensuring that we create the optimum financial value out of your technology and research.

Action Plan 4. Constitute consortia and projects to transform research and innovation.

Action Plan 5. Coordinate the transition of projects and prototype products from research stage to TRL 6 or above in the sectors of Energy, Environment, Health, and many more.

Action Plan 6. Provide innovative solutions and analytical strategies to ensure your compliance with internationally accepted United Nation's Agenda of green practices through eco-friendly innovation.



R&D World Links for Interdisciplinary Research Programs

The decentralized Labs allow scientists from all parts of the world, each with a special expertise, set of resources, and data to collaborate efficiently and work on prolonged R&D projects. These projects result in the sharing of resources and promote clear communication among scientists and help them advance towards mutual sustainable development goals. They provide a simulated environment for Translational Research and Innovation activities, with a distinct focus on digitalization and sustainable practices. Our decentralized infrastructure successfully creates a global lab-to-lab link among experts that leads to the smooth functioning of experiments and research for translational innovation in areas of Health, Energy, and Environment.



Multi-Lateral Collaborations and Partnerships

Institute of Advanced Materials utilizes its decentralized facilities to stimulate global multi-lateral collaborations and partnerships among researchers and scientists from various areas. We create opportunities where scientists find their peers from across the world and connect with them over different R&D programs. Our decentralized facilities act as global interface centers and incubators for ideas to develop into products. By bringing varied expertise on one platform, Institute of Advanced Materials, IAAM's R&D World Links contribute significantly to promoting substantial advances in Translational Research and Innovations. We eliminate the need for researchers to get together every time an idea needs to be discussed. With our globally decentralized facilities, we are making it easier for scientists with similar objectives to connect and work together on a long-term basis for efficient multi-inter-trans disciplinary research programs.



Projects and Consortiums

Institute of Advanced Materials constitutes international consortia and projects for academic disciplines and business areas that hold potential to transform future.

- Flexible and Wearable Electronics
- AI-enabled Smart Healthcare
- Sustainable Battery Systems
- Energy Innovation and Technology
- Sustainable Materials
- Renewable Energy
- Portable Diagnostics & mHealth

Please contact us for enquiry & collaboration
E-mail: research@iaam.se



Training & Courses

Multidisciplinary Training Programs Focused on Advancements of Expertise

We stimulate education through intensive specialized courses meant for professionals at all stages

IAM offers a range of robust Training & Education programs to individuals and company resources in all stages of their professional careers. We offer adequate training programs with upgraded pedagogy, methods, and tools to help company and professionals upgrade in their professional journey. Our programs and collaborative teaching methods are jointly created by disciplinary experts with a focus on delivering sustainability related learning and education.

In line with our focus on Sustainability, our Training & Education programs offer resources, content, and training opportunities related to sustainability principles and education. IAM understands that there is a critical need for professionals to develop skills, talent, and motivation to work towards sustainability. Our programs are meant for policymakers, professionals, young researchers, students, and industry experts.

IAM offers continually evolving and customized sustainability education programs with carefully designed pedagogies. These programs are a method for IAM to break beyond conventional curriculum. We create interdisciplinary programs that combine multiple subject areas and subjects with a special focus on sustainability. These programs are designed and developed fundamentally to promote sustainability education and stimulate a deeper collaboration and partnerships among civil society, academia, and the economic structures of the nation.

The Programs

Our certificate courses help you to develop a better understanding of materials science, engineering, and technology and their extensive applications in health, energy, and environment. We offer topic-specific courses and training delivered through lecture series of multidisciplinary experts from academia and industry. The professionals, researchers, faculty, policy makers, and students can join our programs on the following topics.

- Biomedical Materials and Diagnostic Devices
- Graphene Materials and Sensors
- Advanced 2D Materials and Graphene
- Advanced Molecularly Imprinting Materials and Technology for Sensing
- Biosensors Nanotechnology and Nanomedicine Applications
- Advanced Bioelectronic Materials and Biomolecules
- Energy and Environmental Technologies of the Future
- Advanced Energy Materials and Renewable Sources
- Smart Materials and Interfaces
- Biotechnology and Sustainable Environment Management

Please contact us for enquiry & collaboration
E-mail: education@iaam.se

Partnerships for Grant Applications

Collaboration and Partnership for EU Projects

Institute of Advanced Materials is engaging in sustainable collaborations for EU projects funding. The Horizon Europe R&I strategy aligns with three of our crucial sectors (health, energy, environment). Therefore, we call for interest from those who want to engage in different sectors. We will jointly benefit from research topics, partnerships for consortia and international network.

The Network and Partnerships

Translational Research Innovation Cooperation (TRIC) Consortiums is our way to accelerate networks of cooperation to transform your research from TRL 3 to TRL 6. We have multidisciplinary experts' groups from more than 50 countries. The way to initiate building your project ideas further are by pitch session. This leads to participation in the future project calls, please join our TRIC Consortiums.

TRIC Consortium is developing opportunities towards projects, collaborations, partnerships, internationalization, career development for Translational Research. If you want to shape your idea and look for strong evidence-based partnerships, please join our world R&D links to apply for suitable grants of European Union, European Research Council - ERC, Marie Skłodowska-Curie Actions, M-era.Net, Vinnova and many more.

Starting a Proposal with Us

IAAM is open to support your EU proposals, from writing the application to the completion of the project with its last report. Here it is crucial that you have identified your research topic that you want to grow to consortium and EU collaboration. Therefore, we advise to be agile and initiate the project as soon as possible.



Engaging IAAM for Proposal

IAAM is actively supporting its collaborators to forward a successful application, by screening project ideas, judiciously selecting the right call, rightfully fetching the right partners, and wisely helping the proposal. A brief application form and presentation are starting points. Collaborators are strongly encouraged to carefully follow the Horizon Europe Program and its application manuals.

For more information, please visit consortium page, [TRIC Consortiums](#) and join following appropriate experts' group:

- Flexible and Wearable Electronics
- AI-Enabled Smart Healthcare
- Sustainable Battery Systems
- Energy Innovation and Technology
- Sustainable Materials
- Renewable Energy
- Portable Diagnostics & mHealth

In the TRIC meeting, our experts will support to define strategies for enhancement of your research, technology, and facilities.



Please contact us for partnership & collaboration at research@iaam.se



Professional Community for Global Networking

IAAM supports and connects individuals and organisations around the world with the vision of Advancement of Materials to Global Excellence.

83000+
members
from over
139 countries

How to become an IAAM member?

Submit your IAAM Membership application online at:

www.iaamonline.org/membership



IAAM is one of the leading global organisations in the sphere of advanced materials that actively works to bring together academia, industry, policymakers, government representatives, and the civil community in collaborative networks for the betterment of society.

We provide relevant networking opportunities, help you as a person throughout your career with our services and membership benefits, and support organisations with our specialized initiatives.

Benefits of IAAM Membership

From young professionals to researchers, aspiring scientists to the scientific elites, IAAM membership provides you access to one of the largest networks of advanced materials researchers and gives you opportunities for professional development.

- Become a part of one of the world's largest advanced materials communities
- Register for IAAM events at discounted prices
- A complimentary membership of one year
- Early bird access to various IAAM Resources
- Benefits of IAAM Councils
- Consortium opportunities

Who can be an IAAM Member

The membership of the International Association of Advanced Materials is open to all members of academia and industry. IAAM classifies its membership for researchers and organizations into the following categories:

- Student Member
- Regular Member
- Advanced Materials Charter
- Associate Member
- Associate Fellow Member
- Fellow Member
- Organisational Member

Any researcher who is affiliated to a university, institute, and even those who conduct independent research, are eligible for IAAM membership.

Moreover, corporate houses and organizations that are involved in extensive research can also become IAAM members and take advantage of all the beneficial opportunities and facilities that IAAM provides to its members.



IAAM Fellow Summit

A prestigious worldwide assembly of renowned professionals committed to fostering meaningful discussions and leading international endeavors to combat climate change and promote collaborative actions for the regeneration of our planet, in alignment with the United Nations Sustainable Development Goals for 2030.

HYBRID SETUP



Fellow Assemblies 2023



Baltic Fellow Summit

28 - 31 August 2023
Stockholm, Sweden



European Fellow Summit

23 - 26 September 2023
Southampton, UK



American Fellow Summit

09 - 12 November 2023
Orlando, USA

www.advancedmaterialscongress.org/fellow-summit/portal.php



IAAM Fellow Summit serves as a platform for discussing and advancing global efforts to manage climate change and related challenges. The overall agenda will focus on accelerating action to address the global climate crisis, with a particular emphasis on increasing ambition and accelerating the implementation of the NetZero goals. The summit is expected to be an important opportunity for high-end researchers, policymakers, industry leaders, and government agencies to promote their climate ambitions, present their plans for reaching net zero, and make new commitments to tackle climate change. The proceedings of the summit ensure the ability to move from conscious-raising to agenda-setting to the agreement on action for a sustainable future. As part of this unique summit, IAAM brings together the best research minds of the Advanced Materials academia and industry to accelerate action towards climate neutrality, net-zero, carbon capture, global warming, etc.

HIGHLIGHTS

- Promoting sustainable development plans for reaching net-zero emissions.
- International cooperation in climate change adaptation
- Discussions on effective water management and governance
- Endorsing renewable energy sources
- Promoting netzero research practices
- Participation of high-end researchers, policymakers, industry leaders, and government agencies
- Consortiums on NetZero Goals and Sustainable Developments.

www.advancedmaterialscongress.org/fellow-summit

Latest IAAM's Activities

Addressing Climate Resilience in the IAAM's W119 Side Event at UN 2023 Water Conference, New York

Climate resilience refers to the ability of individuals, communities, ecosystems, and systems to anticipate, adapt to, and recover from the impacts of climate change. Effective water resource management must recognize the value of water and incorporate it into decision-making to align with the UN 2030 Sustainable Development Goals (SDGs). Due to rapid population growth, urbanization, and increasing water needs in livelihoods, agriculture, industry, and energy production, water demand has significantly increased. Thus, water conservation and clean water management are essential to protect human well-being. It was crucial that the IAAM's W119 Side Event at the United Nations 2023 Water Conference, New York focused on climate resilience to ensure the sustainable management of water uses and resources. The topics that were extensively discussed during the two-day side event included the effects of climate change on floods and droughts, integrated water management, nature-based solutions, the water-biodiversity nexus, technology and innovation, socioeconomics and natural disasters, international cooperation, gender and social inclusion, policy and governance, flood monitoring, and drought evaluation, among others.



Fig. 1. IAAM's W119 side event at the UN 2023 Water Conference, New York. The water conference focused on the mid-term comprehensive review of the implementation of the objectives of the international decade of action, water for sustainable development, 2018-2028, #WaterAction.

People, communities, ecosystems, and systems can anticipate, adapt, and recover from climate change. To align with the Sustainable Development Goals (SDG) of the United Nations for 2030, effective management of water resources must recognise the value of water and incorporate this recognition into decision-making processes. The demand for water resources has experienced a significant increase due to rapid population growth, urbanisation, and increasing water requirements in agriculture, industry, and the energy sector. The risks of mismanagement of water can jeopardise lives and disrupt livelihoods, underscoring the urgency of addressing water-related disasters. Sustainable water resource management required climate resilience, focussed on the IAAM's W119 Side Event at the UN 2023 Water Conference in New York. The two-day side event discussed climate change's effects on floods and droughts. In the

current era, achieving climate neutrality through national diplomacy is crucial to achieving global sustainability. Unless progress quadruples, billions of people will still lack access to these basic services by 2030. The inadequate state of water treatment facilities, the emergence of new pollutants, and widespread water pollution all contribute to the exacerbation of this problem. Consequently, ensuring water security requires a concerted effort to mitigate the adverse consequences of floods and droughts. The United Nations decade of action on water and sanitation completes the comprehensive review, at the United Nations 2023 Water Conference (2018-2028). **Fig. 1** shows a glimpse of the IAAM's W119 side event during midterm comprehensive review of the international decade of action, water for sustainable development, 2018-2028. During the UN 2023 Water Conference, the IAAM delegation engaged in

Source Publication

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Addressing Climate Resilience in the IAAM's W119 Side Event at UN 2023 Water Conference, New York
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exchanges and talks with ministers, political figures, committee members, directors, organisational heads, commissioners, and experts. Achieving sustainable practises in the medium and long term requires the implementation of intelligent strategies that encompass both natural and engineered solutions. By effectively storing water in environmentally friendly and resilient grey infrastructures, we can achieve a harmonious equilibrium between the demand for water and its supply, while considering reasonable economic, ecological, and social implications. Since civilisation began, water withdrawals from streams, lakes, aquifers, river diversions, and damming have altered the water cycle, which plays a crucial role in shaping life on Earth. The current state of flood and drought highlights the crucial importance of better water resource management. It involves building a sustainable water resource capacity and implementing strategies to minimise vulnerabilities, enhance adaptive capacity, and promote sustainable development in the face of a changing climate.

WATER, BIODIVERSITY, AND CLIMATE ISSUES

Indeed, there is a growing global demand for resolutions in critical areas to address pressing environmental and social challenges. Resolutions aimed at addressing challenges related to three critical areas: water resources, biodiversity conservation, and mitigation and adaptation are the best initiative. Water scarcity is growing worldwide; therefore, to combat climate change and serve a growing population, this finite resource must be managed holistically. Two-thirds of the world's fresh water is frozen or unavailable; as a result, 1.1 billion people do not have access to water and 2.7 billion have water shortages at least once a year. Inadequate sanitation exposes 2.4 billion people to waterborne diseases such as cholera and typhoid fever, and diarrhoeal diseases kill two million people annually, mostly children.

Reports that emphasise the consequences of agricultural production on biodiversity and water resources identify crucial research areas that require further investigation. The disruption has been further intensified by significant factors, including the Industrial Revolution, Green Revolution, and Socio-Economic. The global effects of water trade are a manifestation of the interconnectedness

between agriculture and socio-environmental factors. Spatial research supports optimisation that minimises threatened species, maximises carbon retention, and water quality regulation, to establish a global place to prioritise terrestrial conservation efforts. Greenhouse gas fluxes from various sources, such as deforestation and agricultural practises, as well as sinks such as reforestation and non-CO₂ agricultural emissions (e.g., methane from livestock), highlight the insufficiency of relying solely on natural climate solutions. In Europe, new technological solutions for development are promoted and implemented rapidly to maintain a stable water supply for humans and the ecosystem. It is urgent to implement cutting-edge purification functionality using advanced materials technology in a sustainable and cost-effective manner.

In particular, significant advances in drinking water treatment technologies were made during the past century, including coagulation, sedimentation, and chlorine disinfection. However, the availability of fresh and sustainable water sources faces growing threats due to factors such as population growth, demographic changes, and the impacts of climate change. Effortless water action plans and resolutions are typically proposed by governments, international organisations or other relevant bodies to promote sustainable practises and protect the environment.

THE UN 2023 WATER CONFERENCE, NEW YORK

According to Resolution 73/226, the General Assembly convened the United Nations 2023 Water Conference, also known as the 'Midterm Comprehensive Review of the Implementation of the Objectives of the International Decade of Action, Water for Sustainable Development, 2018-2028.' This conference took place at UN headquarters, New York, USA, from 22 to 24 March 2023. The conference was co-hosted by Tajikistan and the Kingdom of the Netherlands. The conference ended with an opening ceremony, a closing ceremony, six plenary meetings, and five interactive dialogues. These dialogues were intended to foster collaboration and involve multiple stakeholders, ensuring a diverse representation in terms of gender and geographical balance.



Fig. 2. Opening of the United Nations 2023 Water Conference by Secretary General António Guterres on 22 March 2023 at UN headquarters, New York, USA.

The main focus of the conference was sustainable development and integrated management of water resources, with the aim of achieving social, economic, and environmental objectives. The key features are as follows.

- More than 10,500 registered users signed up for the UN 2023 Water Conference mailing list. Between January 2022 and 27 March 2023, a total of 21 newsletters were sent out to this mailing list.
- The conference format organise six plenaries where member states announce commitments, plans, actions, and best practises.

The conference also emphasised the implementation and promotion of related programmes and projects, in addition to the promotion of cooperation and partnerships at different levels. The UN 2023 Water Conference has five interactive dialogues covering the SDGs for water.

- Water for Health: SDGs 1, 3,4, 5, 17
- Water for Sustainable Development: SDGs 2,8,9,11,12
- Water for Climate, Resilience, and Environment: SDGs 7, 11.5, 13, 14, 15
- Water for Cooperation: SDGs 16, 17
- Water Action Decade: Accelerating the implementation

The meeting had a two-fold purpose: first, to evaluate the advances made in fulfilling the objectives of the International Decade, while reiterating the globally endorsed water-related goals and targets, including those outlined in the 2030 Agenda for Sustainable Development. Second, it sought to recognise the challenges faced, explore potential opportunities, and devise creative strategies to improve the implementation process. Additionally, the meeting aimed to encourage an open exchange of perspectives, generate actionable plans, and introduce new initiatives essential to accelerate progress toward the objectives in the latter half of the International Decade.

Fig. 2, here is the inaugural session of the United Nations 2023 Water Conference on the Midterm Comprehensive Review of Implementation of the Objectives of the International Decade of Action "Water for Sustainable Development," 2018-2028. Furthermore, the objective was to facilitate the sharing of ongoing efforts, exemplary approaches, and valuable experiences gained thus far. Through the active participation of member states and stakeholders in the Conference, a consensus emerged, highlighting the inadequacy of the "Keep calm and carry on" approach in addressing the urgent global water crisis. It is abundantly clear that a transformative change is necessary. Water must be comprehensively comprehended, effectively governed, genuinely appreciated, and diligently safeguarded, with collective welfare in mind. The achievement of these objectives is on the shoulders of all water users and governments, according to their respective capabilities. Water represents a crucial catalyst for achieving sustainable development in social, economic and environmental domains. The speakers stressed the critical importance of accelerating efforts to tackle the global water challenge and promoting profound changes to achieve the Sustainable Development Goals.

On 22 March 2023, the International Association of Advanced Materials (IAAM, www.iaamonline.org) organised Water Dialogues at the United Nations Headquarters, New York. IAAM works in line with the

Sustainable Development Goals of the United Nations for the new decade with the motto 'Advancement of Materials to a Sustainable and Green World'. The purpose of this gathering was to engage in in-depth discussions on water resilience and to foster the integration of diverse knowledge related to water security and water technology. Representatives from various nations, international organisations, academia, and industry converged at the meeting to share their expertise, experiences, and best practises in addressing the challenges associated with water security.

The delegation aimed to explore innovative solutions and strategies that promote the resilience of water systems in the face of increasing global pressures such as population growth, climate change, and urbanisation. This meeting was conducted under the Chairmanship of Dr. Rajendra Singh (People's World Commission on Drought and Flood, PWCDF, www.pwcdf.org), and Dr. Ashutosh Tiwari, Secretary General of International Association of Advanced Materials, who emphasised sustainable growth through water rejuvenation, mitigation, and adaptation measures. The People's World Commission on Drought and Floods was established during World Water Week 2022 in Stockholm with the goal of reducing risks to lives, livelihoods, and ecosystems by building community resilience to extreme weather events such as droughts and floods through community-driven nature rejuvenation. The IAAM aims to leverage proven experiences through indigenous communities' decentralized water resources management, adopting a comprehensive approach to water rejuvenation, action and innovation. The goal is to rejuvenate the hydrologic water cycle using natural mechanisms. The meeting featured a discussion programme, four book releases, among the delegates. The 13th Annual Book of the IAAM (ISBN 987-91-88252-39-5) was also published, detailing the association's work in line with the UN SDGs for the new decade. The IAAM-PWCDF meeting facilitated discussions on comprehensive drought and flood solutions through expert meetings and panel discussions. During the meeting, participants focused on exchanging information on emerging water technologies, efficient management practises, and effective policies aimed at ensuring the availability and sustainable use of water resources. Sustainability, cooperation, and water security were lauded by Indian government officials Gajendra Singh Shekhawat, a member of parliament and Minister of Jal Shakti, and G. Asok Kumar, Director General of Namami Gange. Dr. Rajendra Singh, the Waterman of India, was honoured by the IAAM Secretary General for his enduring efforts to conserve water and he was urged to work even harder to combat the global water crisis. The interactive dialogue yielded significant insights and recommendations. It highlighted the urgent need for collective protection of water and the global water cycle to serve the best interests of all. Currently, the global water cycle is in disarray, intertwining with the critical issues of climate change and loss of biodiversity. This complex interplay exacerbates the challenges posed by the water crisis, which requires comprehensive solutions. One such solution is to accurately assess the value of water, align the pricing with its true value, and implement targeted subsidies where necessary. By adopting these measures, we can strive for more efficient, equitable, and sustainable water use. The

results of this high-level meeting will contribute to the shaping of future policies, strategies, and initiatives aimed at improving water security worldwide.

The UN 2023 WATER CONFERENCE SIDE EVENTS

The open call for side events in connection with the UN 2023 Water Conference yielded 1300 applications. Priority was given to side events organised by Member States and those organised in partnership by several networks/organisations. More than 500 side events took place in connection with the UN 2023 Water Conference, including 200 side events held inside UN Headquarters, more than 180 side events in New York City, and 160 virtual side events. More than 230 summary of side events have been uploaded to the Conference website and more than 140 commitments have been added to the Water Action Agenda by side event organisers.

The side event provided an additional significant opportunity for stakeholders to participate in the UN 2023 Water Conference. Side events could be organised either in person inside the UN Headquarters, in person across New York City or virtually by Member States, the UN system, intergovernmental organisations, and accredited nongovernmental stakeholders. The International Association of Advanced Materials was appointed to organise side events in the UN 2023 Water Conference. The IAAM Sustainable Development Agenda prioritizes access to clean water and sanitation facilities, a goal that is in line with the Sustainable Development Goals of the United Nation. Activities for the UN 2023 Water Conference and the release of the IAAM's 13th Annual Book during the conference are shown in **Fig. 3**. With this objective in mind, the IAAM took the initiative by organising a series of additional events aimed at exploring innovative approaches to address the challenges posed by droughts and floods.



Fig. 3. IAAM delegation at the UN 2023 Water Conference. The release of the 13th Annual Book of the IAAM (ISBN: 987-91-88252-39-5) provided a detailed account of the association's work and activities in line with the UN Sustainable Development Goals for the next decade.

Advanced materials research has sparked innovative approaches to tackle water contamination and improve disinfection methods. This dynamic field holds great promise for addressing the pressing need for clean water on a global scale. In particular, nanofibrous membranes have revolutionised water purification by significantly improving efficiency. Spearheading these advancements through the IAAM consortium and R&D World Link is useful in the development of cutting-edge membranes and pioneering water purification technologies. Additionally,

the IAAM conferences provide a platform for showcasing state-of-the-art clean water technologies symposia. Their commitment to knowledge dissemination is evident through the publication of comprehensive issues dedicated to advanced materials specifically designed for water decontamination. Recognising the utmost importance of securing a sustainable future for humanity, the association acknowledges that it must prioritise this pursuit above all else. The primary focus was to assess the risks associated with climate change and formulate forward-thinking

strategies to improve climate resilience, with special attention paid to water management and preservation techniques. Taking advantage of their extensive experience over four decades, the IAAM adopted an inclusive approach, empowering indigenous communities to actively manage decentralised water resources. Through this comprehensive framework, they aimed to rejuvenate the hydrological water cycle using natural mechanisms. During the side event programme, expert talks and panel discussions foster meaningful conversations and explore comprehensive solutions to combat droughts and floods.

The International Association of Advanced Materials has launched various initiatives to actively contribute to the achievement of the Sustainable Development Goals. IAAM is dedicated to promoting materials research and Innovations that effectively address the pressing needs of sustainable development. By mobilising resources and advanced technologies, IAAM is committed to facilitating this objective. On 23 March 2023, a significant side event took place at Bronx Community College (BCC), City University of New York (CUNY), featuring esteemed

speakers such as Dr. Rajendra Singh, Chairman of PWCDF, and Dr. Ashutosh Tiwari, Secretary General of IAAM. The event was focused on the theme of sustainable growth, focussing on water rejuvenation, mitigation, and adaptation measures. Opening with warm introductions, welcome remarks, and appreciation from Dr. Thomas A. Isekenegebe, President of BCC-CUNY, Dr. Ashutosh Tiwari, and Prof. Paramita Sen, the event proceeded with a captivating keynote address by Dr. Singh. The first session focused on the crucial role of science and society in assessing climate resilience, particularly with regard to droughts and floods. Subsequently, the second session explored the profound wisdom embedded in indigenous knowledge through a panel discussion and a series of enlightening case studies. **Fig. 4** illustrates the Side Event, day one, which took place at Bronx Community College (BCC), which is part of the City University of New York (CUNY). Lastly, the third session dived into the realms of science and technology, highlighting the importance of global cooperation in achieving water security.



Fig. 4. IAAM organised the W119 side event, UN 2023 Water Conference at Bronx Community College (BCC), City University of New York (CUNY), USA. The side event programme featured, published books, and water-themed films were premiered among the delegates.

The side event held during the 2023 UN Water Conference showcased a diverse lineup of distinguished speakers who brought their expertise and knowledge to the forefront. Among the notable speakers were Dr. Paramita Sen, Dr. Neal Phillip, and Dr. Naresh Devineni from the CUNY CREST Institute, V. Prakash Rao, Chairman of IPRBC, Zachary Weiss, Founder of Water Storeys, and Ethan Hirsch-Tauber, Founder of The Water Folk. The event also featured prominent individuals such as Dr. Martin Schoonen from Brookhaven National Laboratory,

Dr. Dimitri Katehis from NYC Dept of Environmental Protection, and Dr. Dipak Gyawali, Commissioner of Himalayan Hindukush, Nepal. Sweta Jhunjunwala, founder of Tulsipatra Foundation, Jalbiradari National Convener Satyanarayana Bolisetty, and Jalbiradari member Nagamani Bolisetty were also present, along with Dr. Christopher Boxe from Howard University and Dr. Snehal Donde, Chairperson of SKECT. Shrikant Paygavhane from Mission 500, India, Rajesh Sundaresan from PWCDF, Sweden, and Nicholas Salazar Sutil, Director of Guardians

Worldwide, added their valuable perspectives. Frederick Kincheloe of Savin Engineers, White Plains, USA, also brought his expertise to the event. The closing remarks were made by Dr. Reza Khanbilvardi, Executive Director of the CUNY CREST Institute. Gajendra Singh Shekhawat, MP and Minister of Jal Shakti, India, and G. Asok Kumar, Director General of Namami Gange, India, commended the importance of sustainability, cooperation, and water security. The United Nations (UN) has recognised the Namami Gange initiative to revitalise India's sacred River Ganga as one of the top 10 World Restoration Flagships to revitalise the natural world. Furthermore, four significant books were launched during the event, namely **“River Rejuvenation Drought and Flood Mitigation Community”, “Drying River of Civilisation,” “Exploration Journey (Khoj Yatra), World Pledge to Rejuvenate the Water Cycle”** and **“Voyage of the**

Water Man”. The side event gathered around 20 scientific experts who provided credible testimony and engaged in discussions on water cycle mitigation, adaptation, and innovation. **Fig. 5** depicts the Book launch in the side event at day one that took place at Bronx Community College (BCC), which is part of the City University of New York (CUNY). With a diverse range of participants, including both on-site and online attendees, the event emphasised the need for advanced water technologies that would contribute to the development of a climate-neutral society. They discussed the world's leading researchers working to better develop methods to manage rain, and their efforts for water security and global utilisation. Interestingly, the event attracted registrations from 300+ participants representing more than 25 countries and featured experts from all continents.



Fig. 5. Four books were published during the UN 2023 Water Conference, New York.

On the second day, the side event took place at **Columbia University on 24 March 2023**, showcasing the growing importance of advanced materials in vital areas such as water cycle rejuvenation, energy, and the environment. These materials have become essential for the achievement of the Sustainable Development Goals set by the United Nations. The event featured a distinguished lineup of speakers, including Dr. Rajendra Singh, Chairman of PWCDF; Dr. Ashutosh Tiwari, Secretary General of IAAM; Prof. Mukand Singh Babel from the Asian Institute of Technology in Thailand; Jayesh Joshi, Founder of Vaaghdhara; Narendra Chugh, Convener of Maharashtra Jalbiradari; Ana Cristina Merino and Abhimanyu Tyagi, Presidents of SUMASA Board 2023, along other esteemed delegates. The session attracted more than 50 students and 100 external participants. Moderated by Sweta Jhunjunwala, a SUMASA alumni and PWCDF advisor,

the event began with an introduction followed by a public lecture by Dr. Rajendra Singh, focussing on water risks due to climate change. A Q&A session followed, and the event ended with UN delegates engaging in discussions with students and faculty from Columbia University. **Fig. 6** depicts the side event on day 2 that took place at Columbia University. The delegations emphasised the importance of revitalising ecosystems and rejuvenating water cycles through global cooperation, including scientific collaboration, and aligning with the 2030 #SDGs Agenda. They highlighted the importance of transboundary water initiatives, recognising water as the primary resource for human survival. Encouraged individuals to contribute to a sustainable future, they stressed the collective responsibility of each person. The event marked the release of three notable water-themed movies, namely Reviving River, Water is Peace, and Resilience.



Fig. 6. Three water-themed films were premiered at Bronx Community College (BCC), City University of New York on 23 March 2023 and Columbia University on 24 March 2023 during the IAAM’s side event.

**WATER ACTION AGENDA:
INTERNATIONAL ASSOCIATION OF
ADVANCED MATERIALS, #SDGAction50056**

The IAAM and PWCDF have taken a global approach to address the challenges of the water system by collaborating with academia, industry, policy makers, governance, and civil society in the field of materials science, engineering, and technology. Their shared goal is to create a sustainable and environmentally friendly world. Using impactful knowledge and practises, they aim to develop effective policies for drought and flood management, which are crucial not only to achieve SDG 6 but also to promote overall health and food security.

KEY ISSUES DISCUSSED

Reduce risks to life, livelihoods, and ecosystems while increasing resilience through key points.

- Response to drought and floods, resilience, and mitigation.
- Water research on climate resilience, challenges, and best practises adopted through case studies.
- Importance of government, industry, and public society in combating.
- Climate-neutral R&D and green technologies for the Sustainable Development Agenda.
- Revitalise the ecosystem and rejuvenate water cycles through global scientific cooperation.
- Education and training for the community to adopt environmentally friendly practises and promote the pledge of water.

KEY RECOMMENDATIONS FOR ACTION

By rejuvenating nature, communities can build resilience to extreme weather events such as droughts and floods, reducing the risks to lives, livelihoods, and ecosystems. Following the proposed implementation:

- Community-led nature rejuvenation. Implement clean and safe water management.
- Prepare an annual report to provide a summary of the state of floods and droughts.
- Train students to adopt and implement sustainable ecological practises.
- Develop health management practises for waterborne diseases to achieve the SDGs agenda.
- Climate-neutral R&D and green technologies for water.
- Pratique of involving government, industry, and public society in combating droughts and floods.

The final session of the conference marked an important moment, as it featured closing remarks from distinguished individuals, including the Secretary-General of the United Nations, the President of the General Assembly, the Chair of UN-Water, the Director-General of the International Labour Organisation (ILO) and the President of Tajikistan.

“As the most precious global and common good, water unites us all. That is why water needs to be at the centre of the global political agenda”.

- António Guterres, United Nations Secretary General

‘Today’s conference should go down in history not only in terms of promoting a correct understanding of challenges and problems, but also in finding effective and efficient solutions’.

- H.E. Emomali Rahmon, President of Tajikistan

‘We will not rest until water has the place it deserves in global agendas and policy programmes. We will create a fluid connection between water and the broader work of the United Nations up to 2030 and beyond’.

- King Willem-Alexander of the Netherlands

'Our decades of experience and local knowledge of decentralised community-water management systems will be used to mitigate drought and floods. We envision a world free from droughts and floods. In this sense, our opinions about drought and flood-free world will be expressed through the World Water Council'.

– *Rajendra Singh-Waterman of India*

KEY OUTCOME OF THE CONFERENCE

Resolution 75/212 of the General Assembly outlines the results of the UN 2023 Water Conference. The conference proceedings are summarised in the mandated outcome document. We need clear commitments, promises, and actions across all sectors, industries, and interests to unite nations, stakeholders, and professionals on water actions in

the 2030 Agenda for Sustainable Development that can be scaled and replicated. SDG 6 and other water-related goals and objectives should be implemented faster and with greater impact, considering content, process, and structure. Water problems require creative solutions and a "beyond business as usual" approach. The United Nations Conference on the Midterm Comprehensive Review of the Implementation of the Objectives of the International Decade of Action "Water for Sustainable Development", 2018-2028, came to a close with the ceremony depicted in **Fig. 7**. IAAM suggests that nature restoration be led by the community. Take care of clean water, write an annual report on floods and droughts, and change your habits to be more eco-friendly. Droughts and floods are hard to deal with, but research, government policy, process improvements in industry, and public awareness can help.



Fig. 7. Closing ceremony of the United Nations 2023 Water Conference on 24 March 2023 at General Assembly, United Nations Headquarters, New York.

TRANSFORMATIVE WATER ACTION AGENDA

The Water Action Agenda has consolidated more than 700 voluntary commitments, serving as a crucial framework to achieve Sustainable Development Goal 6 of ensuring clean water and sanitation by 2030. The financial implications of the pledges made during the Conference are substantial, exceeding \$330 billion, and capable of leveraging nearly \$1 trillion in valuable services for both humanity and the environment. In particular, most of these commitments originate from civil society, highlighting the pivotal role that nongovernmental actors must play in accomplishing SDG 6 and creating a water-secure world for all. The Water Action Agenda established commitments, pledges, and actions, in all sectors, industries, nations, stakeholders, and professionals, that contribute to the achievement of the

2030 Agenda for Sustainable Development, actions that can be scaled and replicated over time. The importance of cooperative and inclusive action is emphasised, bringing together multistakeholder coalitions that rally local communities, indigenous peoples, civil society organisations, governments at local and national levels, as well as international organisations.

MEMBER STATES

The US pledged \$49 billion to water and sanitation. Japan will develop a 'quality infrastructure' and provide 500 billion yen (\$3.65 billion) over five years to address Asia-Pacific water-related social issues. Vietnam promised to manage the main river basins by 2025 and provide clean water to all households by 2030. Switzerland made five commitments to the UN, including the Water Convention and transboundary cooperation. The Niger Basin Authority

(NBA) and the German Federal Ministry of Environment, Nature Conservation, Nuclear Safety, and Consumer Protection (BMUV) pledged \$21.2 million to strengthen the NBA and its member countries. Mozambique pledged to invest \$9.5 billion to accelerate SDG 6 by 2030. The Continental Africa Investment Programme (AIP) of the African Union Commission aims to mobilise at least \$30 billion / year by 2030 to close Africa's water investment gap. By 2030, the EU wants to help 70 million people get better water and sanitation. The EU will give Member States €20 million to accelerate COVID-19 wastewater surveillance. More than 50 leading global companies are committed to SDG 6. All the above information was disclosed during the conference.

MULTILATERAL BANKS

By 2030, the Asian Development Bank will invest \$11 billion in Asia-Pacific water issues and \$100 billion worldwide. Starbucks, Ecolab, Gap Inc., Reckitt, and DuPont invested nearly \$140 million in water issues with the U.S. government to reach 5 million people. DANONE's water issues fund will provide 30 million people with safe daily water. Xylem and 16 others invest \$11 billion in R&D. The World Benchmarking Alliance will evaluate 1,000 global companies in 22 industries on their water issues. NGOs World Vision pledged to raise and invest \$2 billion by 2030 in water issues in 50 countries in six regions. All of the data above were released at the conference.

OVERVIEW OF ISSUES AND ORGANISATIONAL RESOLUTION

The main focus of this article is to explore water resources, scarcity, United Nations Sustainable Development Goals, and advanced materials technology through the lens of

climate neutrality. Climate resilience is a multidimensional concept that encompasses a variety of strategies, actions, and approaches to address the impacts of climate change. It recognises the importance of proactive measures to reduce vulnerabilities, improve adaptive capacity, and promote sustainable development in the face of an uncertain and changing climate. Several advances in water technology, novel materials, and the management of emerging issues through control are crucial and leading initiatives in the current situation. A further important outcome of the Conference was the establishment of the Water Action Agenda, which included commitments that will contribute to the achievement of the 2030 Agenda for Sustainable Development Agenda. Both IAAM and the UN need to improve their scientific understanding of advanced innovations and embrace new technological trends in the water sector to meet the commitments they have made. Experts in the side event of the UN 2023 Water Conference delved into discussions and suggested improving water governance, strengthening international cooperation, and promoting capacity-building efforts in the field of water security. Understanding regional water crises, both IAAM and the UN need to improve their scientific understanding of advanced innovations and embrace new technological trends in the water sector to live up to the commitments they have made. Biodiversity, climate, and technology availability are key elements in the green transition. It is unlikely that global net zero or neutrality will be achieved in the coming decades, despite the partial efforts outlined in the UN-IAAM agenda. The UN 2023 Water Conference, which took place in New York, made a significant contribution to the advancement of climate resilience in water management and promoted sustainable development in the face of climate change by addressing key points.

Advancement of Materials to Sustainable & Green World

The International Association for Advanced Materials is optimistic that the United Nations' Sustainable Development Goals (SDGs) can be achieved through scientific consideration of circular materials and embracing new green technological advances, as well as by keeping global commitments to reduce climate change, adapt to it, and come up with new ways to deal with it. The present green transition projects rely heavily on the accessibility of biodiversity, climate, and net-zero technologies leading to a sustainable future. A sustainable and green world refers to a global society that operates in harmony with nature, respects ecological limits, and ensures social and economic well-being for present and future generations. It is characterized by responsible resource management, reduced environmental impact, social equity, and the protection of ecosystems. In the context of effective climate resource management, it is necessary to recognize the value of natural materials and incorporate them into ongoing practices and processes. Understanding materials selection, along with leveraging nature-based solutions and renewable technologies, plays a significant role in driving the world's circular economy while ensuring sustainability. Addressing pollution, reducing reliance on non-renewable energy sources, adopting low-carbon materials, and eliminating plastics and harmful chemicals are essential steps toward creating a circular market that connects materials in a circular manner. This approach aligns with SDGs along with the Conference of the Parties (COP), and European Green Deal (EGD), which also emphasizes sustainability, net-zero, and circular processes. In this quest, advancements in climate-efficient materials science and technology, coupled with waste resource innovations, have potential usefulness towards all-in-one green solutions. Thus, it is crucial for the research community to focus on green R&D practices, and topical consortiums as much as possible. By prioritizing climate-efficient materials, promoting sustainable practices, and fostering innovation, the advanced materials world community can work towards materials development goals for a sustainable and green world.

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Advancement of Materials to Sustainable & Green World

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The International Association of Advanced Materials (IAAM, Org. 802503-6784) was established as a non-profit research organization on Wednesday, January 20, 2010. Since then, it has actively engaged worldwide in various endeavors and accomplishments, committed to the United Nations Sustainability Development Goals. In 2015, all UN member states adopted the 2030 Agenda for Sustainable Development Goals, aiming to promote peace, prosperity, and environmental sustainability for both present and future generations. IAAM's agenda for the decade is committed to the "Advancement of Materials to Sustainable and Green World", which signifies a substantial undertaking in global policy and governance. IAAM's primary focus for 2030 is on advancing materials towards the development of green technologies and contributing towards the building of a 'Climate Neutral Society' through a circular process of environmental restoration. It is worth noting that since 1970, the Asia-Pacific emerging economies have quadrupled the global materials footprint, which has plateaued since 2014. IAAM emphasizes the importance of inclusive sustainable principles with embedding the advancement of climate-efficient materials. The combined biomass, fossil fuels, and mineral extraction increased from 48 to 69 billion metric tons between 1995 and 2008. This outcome indicates that secular structural changes and

technological advances alone are insufficient to limit material use.

Recognizing the significance of IAAM's climate activities, the 2023 United Nations Water Conference has accredited the association for its water and climate change activities related to UN SDG Goal 6. These activities align with the action plans of the water conference, which aim to ensure global water sustainability. **Fig. 1** represents IAAM's activities at the UN 2023 Water Conference held in New York. The conference is persistent on Sustainable Development Goal 6, addressing climate resilience in the context of droughts and floods. By promoting the convergence of advanced materials in water and climate research, IAAM has facilitated global collaboration and generated valuable insights and initiatives toward achieving net-zero emissions. Throughout the conference, the importance of water to sustainable development was highlighted by referencing the International Decade for Action on Water for Sustainable Development, 2018-2028.

This editorial article aims to discuss the climate impact of eco-friendly materials within this context and provide an overview of climate resilience for a green world. The articles also outline the important tasks of materials in attaining the UN Sustainable Development Goals 2030.



Fig. 1. IAAM led prominent initiatives at the 2023 United Nations Water Conference in New York. The prominent efforts and contributions of the IAAM to the Sustainable Development Goals were discussed during the conference.

GLOBAL SUSTAINABILITY AGENDA

The IAAM facilitates open discussions, knowledge sharing, and collaborative efforts among academia, industry, policymakers, and civil society organizations. Its objective is to enhance coordination among governments, academic institutions, industries, NGOs, policymakers, and other stakeholders, with the aim of generating innovative ideas and pooling resources to effectively combat global climate change.

Advancement of materials underlines SDGs

IAAM primarily promotes the UN's Sustainable Development Goals (SDGs) combining its materials' commitment to global excellence. Advanced materials are replacing traditional materials in numerous green applications day by day. They play a vital role in accomplishing the UN's SDGs as they are utilized in manufacturing processes across various sectors, including healthcare, energy, water, and more. Businesses in different

industries are enhancing their processes and manufacturing techniques by incorporating intelligent materials. Therefore, SDG categories and details were provided to facilitate a better interpretation of the process. IAAM aims at several major SDGs based on materials advancement and green world initiatives. The key Goals are all interconnected with the advancement of materials; therefore, it is important that all stakeholders must achieve them by 2030. The important associated goals are highlighted below:

SDG 3. Good health and well-being

Advanced Materials have abundant applications in the healthcare sector and can help enormously in ensuring healthy lives for people around the world. By leveraging materials science and innovation, we can create safer, more efficient, and sustainable solutions that promote well-being, improve healthcare outcomes, and ensure healthy lives for all. Materials advancements are facilitating therapeutics and medical devices. New materials with improved properties are advancing medication, medical equipment, and devices, enabling functionality that was previously thought impossible. Healthcare needs are driving experts to engineer and create new materials.

SDG 6. Clean water and sanitation

Many recent developments in advanced materials have presented new approaches to deal with the challenges of water contamination and disinfection. The field has great potential to meet global clean water demand. For example, nanofibrous membranes are investigated to purify water more efficiently. IAAM is involved in wastewater management and developing efficient water purification technologies. IAAM is privileged to be at the forefront of the water community to rigorously discuss water-related issues. Since 2011, IAAM congresses and events have given a special focus on Water Technologies and discussed the challenges and opportunities. To enrich the area, IAAM also published proceedings and the thematic issues on 'advanced materials in water decontamination'.

SDG 7. Affordable and clean energy

Advanced Materials are indispensable to fulfilling the demand for clean energy and making possible a sustainable world. Materials are accelerating the efficiency of photovoltaic harnessing for solar energy production. Polymer matrix composites also make wind turbines. Enhanced geothermal systems require new materials and technologies. Advanced materials can transform nuclear energy and reduce fossil energy fuel consumption and greenhouse gas emissions with structural ingredients, advanced ceramics, and fuel coatings. Corrosion-resistant coatings, carbon fiber composites, Phase change materials, and optical metamaterials will also help energy transportation, storage, and buildings. IAAM collaborates with energy companies and experts to translate new materials for a clean and sustainable energy future.

SDG 9. Industry, innovation, and infrastructure

Materials are responsible for innumerable valuable innovations around us. Cars and physicists' lasers use advanced materials. These resources are also heavily used

in automotive, aerospace, electronics, metals, energy, healthcare, telecommunications, chemical, and other industries. Green materials innovation and technology can improve the circular economy and sustainable infrastructure in many industries. IAAM hosts business-academia consortiums and symposia for collaboration to improve net-zero business innovation.

SDG 12. Responsible consumption and production

The competence of processes is directly connected to the consumption of resources. The utilization of advanced materials has significantly enhanced the effectiveness of energy extraction from fossil fuels. Reports indicate that the efficiency of coal power plants can increase by up to 42% with the implementation of new power plant technologies. Technological advancements in coatings have resulted in improved fuel efficiency. Advanced materials are also instrumental in driving resource conservation initiatives in various other fields. Advanced rubber composites have prolonged the lifespan of tires, and low-emissivity windows and eco-friendly insulation have led to substantial energy cost savings. The IAAM is dedicated to conserving natural resources through the enhancement of green materials, structural materials, and cooperation with energy experts. Furthermore, our commitment to making literature freely available online is aimed at educating the public about their role in promoting environmental sustainability.

SDG 13. Climate action

Advanced materials and nanotechnology are powerful tools that can help us tackle this impending global disaster. Commercial vehicles can save fuel by using lightweight nanocomposite materials. Nano-coatings are the best tool for reducing emissions and producing clean energy. Nano-structured materials like aerogels can also reduce building heat transfer and heating system loads.

SDG 14. Life below water

The development of materials for marine conservation and restoration efforts, such as artificial reefs and sustainable aquaculture systems, can help protect and restore marine ecosystems. Additionally, potential hazards like microplastics and essential nutrients should be removed from the aqua system for healthy aquatic life. By adopting a materials perspective, IAAM is trying to contribute towards the sustainable management and preservation of our oceans and marine resources.

SDG 17. Partnership for the goals

It emphasizes the importance of partnerships and collaborations to achieve sustainable development goals. IAAM is dedicated to contributing to SDG 17 by fostering collaboration among stakeholders in the materials science and engineering field. This includes partnerships between academia, industry, governments, and non-governmental organizations to share knowledge, resources, and expertise. Collaborative efforts can accelerate research and development of sustainable materials, promote technology transfer, and support capacity building in developing countries. By fostering partnerships, we can leverage collective strengths, mobilize resources, and drive innovation to address global challenges and achieve all the sustainable development goals.

Conference of the parties

The highest decision-making body, the Conference of the Parties (COP), includes all convention parties of the states. This conference makes convention implementation decisions. In 1995, the first COP meeting was held in Berlin. The United Nations Framework Convention on Climate Change (UNFCCC) assesses climate change with the COP and evaluates the goals of the convention, as well as the national communications and emission inventories that have been submitted by parties. During COP21 in 2015, the world agreed to restrict global warming to 1.5°C. Every year, COPs discuss the climate agenda and establish a climate action plan to guide overall efforts. In 2023, COP 28 will be organized in Dubai, UAE to discuss the status of the goals set by the Paris Agreement. IAAM's overarching vision at COP is to promote global materials sustainability by fostering international collaboration, advocating for climate-efficient materials policies, and implementing circular innovative resolutions to address climate change and environmental issues.

Overarching vision at COP

The stability of the world's ecosystems is threatened by the climate crisis. The principles of equity, sustainability, and resilience serve as the foundation for IAAM's vision. The association envisions a world in which all countries, regardless of their economic standing, collaborate to reduce greenhouse gas emissions, prepare for the effects of climate change, and promote sustainable development. To achieve COP's vision of promoting sustainable materials development, IAAM has set the following goals:

- Assessing the latest climate change research.
- Promoting biodiversity and climate rejuvenation.
- Signing international agreements for advanced technology.
- Implementing oversight for climate-related pledges, i.e., air, water, and earth.
- Promoting cooperation, training, and dialogue for climate change mitigation and rejuvenation.

The IAAM fosters international cooperation and collective action to combat climate change, promote sustainable development, and protect the planet for future generations. IAAM focuses on circular innovations and translational research to advance materials to global excellence in emerging fields like health, energy, and climate. Advancing Materials towards Climate Neutrality is important to attain within the given time schedule. Advanced materials support lightweight composites, alloys, electronic controls, high-density batteries, and more. However, many of these materials technologies in the production, energy, and water fields are not sustainable and require redirection towards more environmentally friendly pathways. IAAM actively participates in global issues, such as biodiversity loss, deforestation, waste disposal, air pollution, water issues, the burden of plastics, global warming induced by fossil fuels, and climate change, by promoting advanced materials technologies. Bioplastics are very useful in addressing several environmental issues. Despite their pivotal role, advanced materials often go unnoticed by end-users who

benefit from advancements in technology. Thus, materials innovations are crucial to achieving the Sustainable Development Goals. This editorial discusses the climate impact of eco-friendly materials in this context and provides an overview of climate resilience for a green world. The articles delve into the value proposition of sustainable products and outline strategic approaches to prioritize sustainability, highlighting the necessary role of materials in achieving Sustainable Development Goals.

MATERIALS POLICY FOR SUSTAINABILITY AND GREEN WORLD

IAAM upholds a comprehensive global perspective on trends in materials sustainability. It evaluates organizational processes related to materials against evolving standards, such as those for net-zero policies and sustainability regulations, to determine the subsequent steps to be taken in addressing climate change. Effective management can adopt all recommended policies and objectives, ensuring that the industry progresses towards a carbon-neutral and net-zero ecosystem for green growth. The global economy has consumed an excessive number of materials, exceeding 100 billion tons in 2019. However, the concept of the 'Circularity Gap' aims to reduce consumption levels and address climate change. Through the implementation of various changes, new innovations can evolve more sustainable systems and foster a circular economy that operates in harmony with nature. The goal is to shift our economy towards a regenerative and natural approach that promotes resource shifting, reusability, and recycling. Greenhouse gas emissions come from materials manufacturing.

In 2015, materials production emitted 11 billion tons of CO₂ equivalent, a 120 percent increase from 1995. Materials efficiency and the circular economy are promoted to reduce emissions, but our understanding of materials-connected greenhouse gas emissions is restricted. By harnessing diverse resources and embracing recycling and regeneration, the advanced materials community can develop sustainable solutions that contribute to a circular economy framework. The construction and housing sector urgently needs to consider the impact of materials on climate-neutral ecosystems. Currently, the infrastructure built, including roads, bridges, buildings, and homes, outweighs the natural biomass found in trees and animals. To mitigate the environmental burden associated with these civil and structural requirements, circular economy strategies must be employed, and building practices should prioritize harmonization with nature. This sector alone is responsible for emitting billions of tons of greenhouse gases annually. The commitment of IAAM over the decade in developing policies and management for environmentally friendly materials, biodiversity, digitalization, renewable energy resources, carbon-neutral technology, and green chemistry approaches are greatly benefitting the implementation of the SDGs, the Conference of the Parties, and European Green Deal. **Fig. 2** references the United Nations' Sustainable Development Goals, green technology, and the circular economy, highlighting their roles in advancing materials toward a sustainable and green world.



Fig. 2. The figure depicts the interconnection between the United Nations' Sustainable Development Goals (SDGs), green technology, circular economy, and the advancement of materials towards creating a sustainable and green world. The figure shows how the UN's SDGs, circular economy, green chemistry, carbon-neutral technology, renewable energy, digital technology, biodiversity, and eco-friendly materials for advancement interact. It shows health and environmental interdependence.

Green practices and renewable technologies

Nature-based solutions and renewable technologies play a crucial role in mitigating the environmental impact of society. The implementation of solar, wind, and water power in low-energy infrastructures can significantly reduce their carbon footprint. Solar and wind energy not only improve drought resilience but also contribute to groundwater sustainability. Therefore, the utilization of lightweight local resources and low-carbon building materials helps decrease energy consumption in infrastructure. Nature-based solutions, such as green roofs, living walls, and the use of materials like wood, straw, and hemp, not only lower energy demands but also increase biodiversity and regenerate ecosystems. These solutions improve resource performance, water management, biodiversity, and air quality. In addition to nature-based solutions, renewable technologies can also have a substantial impact on the circularity of materials and green energy use. Incorporating innovative design principles can reduce the need for mechanical space heating, cooling, and ventilation. For example, constructing net-zero modular climate-neutral homes that utilize upcycled and locally sourced materials is the best way to counterbalance pollution. Net-zero homes can also integrate sustainable features like rainwater harvesting and passive cooling, contributing to the overall goal of achieving a circular economy. Both businesses and consumers should prioritize bio-based alternatives, eco-friendly materials, and biofertilizers to reduce environmental degradation. It is imperative to prioritize sustainable materials for chemical-free consumables to reduce environmental toxins and pollutants.

Non-renewable energy

In the framework of the Sustainable Development Goals, it is essential to acknowledge the limitations of non-renewable energy sources and their contribution to

greenhouse gas emissions, given the increasing demand for affordable energy to drive industrialization and development. Considering the uneven global distribution of energy sources, immediate action is required to implement changes in energy generation and distribution, guided by sustainability principles. This includes the adoption of strategies aligned with SDGs, such as nuclear power, carbon capture and storage, and biofuels. To achieve climate neutrality, it is vital to develop innovative approaches that regulate carbon emissions, reduce the costs of renewable energy, and advance the development of environmentally friendly, cost-effective, and scalable energy production and storage technologies. These technologies should prioritize the utilization of abundant and recyclable materials and employ clean and affordable processes.

Promoting circular materials for achieving SDGs

To align with the Sustainable Development Goals, it is essential to prioritize the recycling of consumables when other options such as refusal, repair, and refurbishment have been exhausted. By closing loops and fostering secondary markets, we can establish a circular consumables market that promotes sustainability. The 'Circularity Gap Report' provides evidence of how a circular economy reduces consumption and mitigates climate change. Government agencies play a critical responsibility in facilitating the recycling of various materials, including plastics, synthetic fibers, paper, wood, and by-products. They can enforce regulations that mandate the use of recycled content and encourage the substitution of raw materials with recycled materials. It is imperative to address the issue of excessive plastic production and strive for its reduction. According to the 'Circularity Gap Report 2022', these collective efforts have the potential to save 2.18 billion tons of materials and reduce greenhouse gas emissions by 1.23 billion tons on a global scale. Recent

research highlights that chemical pollution stemming from plastics and agricultural fertilizers is among the most pressing concerns. We must acknowledge that the products we utilize, and discard do not simply vanish. An integral aspect of the circular economy is its influence on climate mitigation and the establishment of fair societies through resource reallocation and the adoption of reusable and recycling models.

Adopting bio-products and remediation

Despite recycling efforts, plastic waste continues to accumulate in the biosphere. Therefore, there is a need to develop sustainable materials like bioproducts as alternatives to synthetic plastics. The food-packaging industry, which is gradually phasing out plastics, can serve as a model for adopting bioproducts. Advancing bio-based materials for sustainable solutions in health and food are the best way to achieve sustainability. Rapid research and commercialization are necessary to bridge the knowledge gaps in this field. Numerous climate-efficient materials-based solutions offer unprecedented opportunities for remediating environmental issues. Environmental remediation utilizes nanotechnology-based materials, such as inorganic, carbon-based, and polymeric materials, to remove heavy metals, dyes, chlorinated, organophosphorus and volatile organic compounds, halogenated herbicides, and more. These materials can effectively treat various components in air, water, and soil through pollutant adsorption/catalysis, hydrogen production and storage, and waste management. They form the foundation for implementing advanced climate-efficient material-based strategies to improve environmental health.

Advancing materials for circular economy

Current and future research aligns with the UN's SDGs, enabling technological solutions to combine with interdisciplinary innovation and natural methods, accelerating progress towards these SDG goals. In the pursuit of sustainability, materials science emphasizes targeted solutions, technology translation, and the circular economy, and sets examples of successful goal implementation. Circular economies protect the environment and resources while promoting sustainable growth, health, and jobs. Nanotechnology plays a significant role in advancing global sustainability efforts. **Fig. 2** refers to the SDGs of the United Nations and highlights the role of the circular economy in developing an environmentally friendly world. By translating technological advancements into practical applications, the field of advanced materials effectively implements sustainable practices in sectors such as energy, water, agriculture, and healthcare. Through targeted research and development, nanotechnology offers innovative solutions to address various sustainability challenges. Intelligent Nanomaterials provide advanced nanotechnology that can transform the perspective toward climate neutrality. Closed metal cycles contribute to green high-tech products by decreasing CO₂ emissions in their production. By embracing net-zero technology, the circular economy, and integrating nature-based solutions with renewable technologies, we can transform our economy and mitigate the environmental impact.

Understanding the regional roadmap and framework model of the circular economy is important for the world's developmental process. Europe's framework tracks the EU's progress toward a circular economy and considers how it can pay to climate neutrality, resilience, and sustainability. The United Nations Environment Programme (UNEP) is the top comprehensive agency on the environment, and its circularity platform provides an understanding of the circularity concept for sustainable consumption and production patterns. Natural resource use threatens Earth's carrying capacity. The transition from a linear, i.e., take, make, dispose to a circular, i.e., renew, remake, share economy is expected to help achieve the SDGs, especially SDG 12 on responsible consumption and production. Our consumer-driven society is putting enormous pressure on the planet. Sustainable production and consumption, along with a global resource-efficient circular economy, offer practical solutions for long-term development. Understanding the approach and experience in building circularity is important for the energy sector too, particularly in the recycling of batteries. These circularity actions are essential for building a more resilient future based on health, the environment, and the energy sector, ensuring a greener world.

DELIVERABLES FOR MATERIALS SUSTAINABILITY

The International Association of Advanced Materials (IAAM, www.iaamonline.org) was established as a non-profit research organization with a head office in the natural environment of Ulrika, Östergötland, Sweden and engaged worldwide in various endeavors and accomplishments related to materials advancement and sustainability agenda. IAAM hosts councils for these communities and consortiums to collaborate, and share knowledge, and research. IAAM supports academia, businesses, youth, women, social organizations, and governance. Scientific professionals can network, share knowledge, and form lasting partnerships at IAAM.

Materials sustainability and R&D world links

The IAAM's 'R&D World Links' initiative encourages students, researchers, and organizations working toward a greener future to collaborate on education and research. Business leaders' contributions to translational research and circular materials for a sustainable and environmentally friendly future are recognized by IAAM. IAAM creates communities, consortiums, and councils for specific age groups and career stages to promote global scientific excellence. IAAM's focus is to establish an interconnected and interdisciplinary materials network, facilitating inter-trans-disciplinary collaborations through R&D World Links. IAAM facilitates the exchange of information, research collaboration, education, and international outreach, thereby expanding the global network and collaborations among IAAM members. IAAM develops water action plans and resolutions in line with the United Nations SDGs agenda, promoting sustainable practices and environmental protection. **Fig. 3** depicts an IAAM delegation discussing the association's next decade's UN SDGs during the UN 2023 Water Conference held from 22 to 24 March 2023, at the UN headquarters in New York,

USA. Through sustainability initiatives, IAAM's aim is to contribute to society by advancing scientific knowledge, fostering innovation, and addressing global climate challenges. The European Union models track the circular economy through indicators such as material footprint, resource productivity, and waste avoidance. It also considers greenhouse gas emissions from production, material imports, and raw materials information. To

succeed in materials development and promote a sustainable climate, monitoring is essential. All organizations utilize climate diplomacy to achieve global eco-neutrality. Together, we can create a world where scientific advances and responsible practices address our most pressing issues. Our goal is to establish a sustainable and regenerative system by focusing on resource efficiency, waste reduction, and material recycling.



Fig. 3. The UN 2023 Water Conference, held at the UN headquarters in New York during 22 - 24 March 2023, showcased the association's decade-long efforts in alignment with the UN Sustainable Development Goals. IAAM organized a W119 side event on Climate Resilience: Addressing drought and flood in collaboration with the People's World Commission on Drought and Flood, Bronx Community College (BCC), City University of New York (CUNY), and Columbia University.

Deliverables of IAAM over a decade

The International Association of Advanced Materials has created one of the largest global networks for the advanced materials community. IAAM provides highly interactive international networks that serve as forums of collaboration for the advancements of materials science, engineering, and technology. The following specifies an overview of the key activities undertaken to achieve excellence:

Global network for materials' excellence: IAAM's activities for the advancement of materials to global excellence are focused on sustainability and how materials shape the future. With a membership of over 80,000 individuals from more than 130 countries, IAAM aims to support translational research collaborations and partnerships in the field of R&D. As IAAM sets out on this journey, its main objectives are to foster collaborative efforts, inspire innovation, and acknowledge remarkable accomplishments in the advancement of sustainable materials.

International consortium and forums for global impact: IAAM strongly believes that comprehensive challenges require global solutions through a group of complementary experts. Engaging in 2000+ translational research opportunities on advanced materials and technology for a sustainable and green future. Sustainable development can be accelerated through the promotion of international partnerships, collaborative projects, and information sharing. The association has always planned the consortium in such a way that they present the ideal combination of significant research fields and offer delegates a truly multidisciplinary experience. By working together, experts can pool their unique experiences, knowledge, and resources to effect positive change on a global scale.

IAAM Education and Research: Education and research opportunities play a crucial role in advancing sustainable development and achieving the various Sustainable Development Goals (SDGs). IAAM is committed to promoting education and research activities with its institutions in interdisciplinary advanced materials fields. So far, the organization has established two institutes, started various courses for master's, Pre-PhD, and PhD students, and provided research funds, fellowships, travel grants, and training courses (**Fig. 4**).

Hosting esteemed global expert networks: The IAAM platform brings together leading experts, researchers, and industry professionals to collaborate on innovative solutions. IAAM has successfully curated a collection of 7500+ lectures delivered by famous speakers and has hosted over 18000 esteemed delegates from around 125 countries across the globe. These gatherings have taken place in more than 75+ IAAM conferences, comprising over 1600+ sessions & symposia (Fig. 4).

Recognition and accolades: The association takes great pride in its award program, which has been dedicated to advanced materials for over a decade. These researchers are presented with IAAM awards and honors, such as Laureate, Fellow, Medal, and Scientist Award, among others, to enhance the quality of contemporary research. To date, more than 2,500 researchers from over 75 countries have been honored and recognized until December 2022 (Fig. 4). This recognition acknowledges their unwavering dedication, innovative contributions, environmental impact, and advocacy for sustainability. Nominations are welcomed from around the world, and the winners will be acknowledged for their exceptional efforts during the IAAM Annual Conference. The Materials Sustainability Award and Innovation Award specifically celebrate the achievements of materials innovators.

Interdisciplinary collaborations for synergistic impact: The IAAM promotes global research, education, and industry collaboration. The IAAM council promotes transformative interdisciplinary approaches to sustainability through dialogue, joint research, and knowledge sharing. These councils promote cooperation, innovation, and sustainability.

Not-for-profit publication across disciplines: The association has found synergistic solutions to environmental, social, and economic problems by encouraging collaborations between materials science, engineering, biology, and social sciences. Three journals support 25+ books and 50+ proceedings. IAAM promotes non-profit open-access publishing and innovations. IAAM is one of the pioneering non-profit scientific publishers. This decade, IAAM has become the leading organization for advanced materials publications. Advanced Materials Letters facilitates access to important and insightful scientific research. IAAM's open-access model allows authors to publish journals and books without processing or publication fees. Another international journal that publishes materials science and technology conference proceedings and peer-reviewed articles is IAAM's Advanced Materials Proceedings. IAAM disseminates scientific research and knowledge about advanced materials to researchers worldwide by eliminating associated costs, including the use of audio-visual journals and video proceedings. Video Proceedings of Advanced Materials is an open-access, peer-reviewed video journal that publishes state-of-the-art research advancements in materials science, engineering, and technology. The journal covers advanced materials research, innovation, and technology in an audio-visual format.

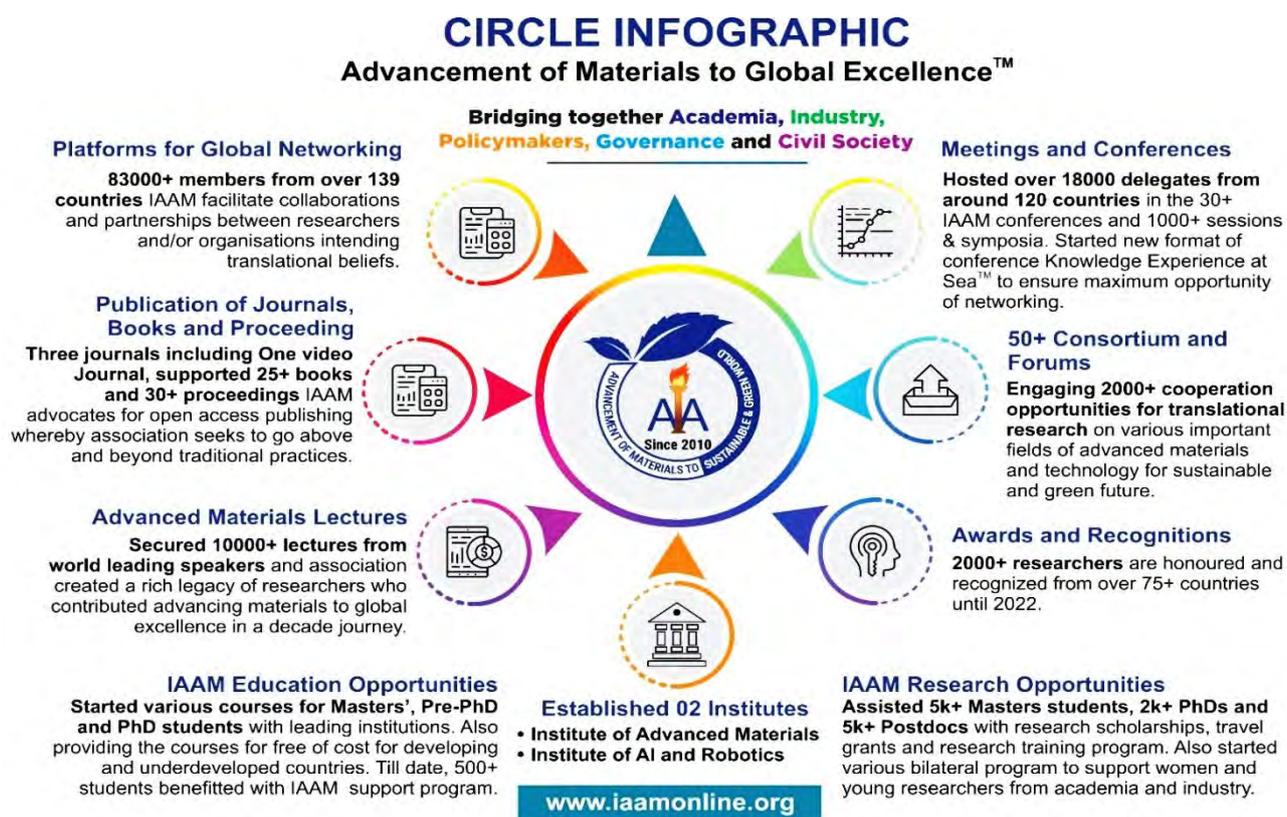


Fig. 4. Circle infographic IAAM, showing the activities of IAAM towards the advancement of materials to global excellence.

Decentralized R&D and centralized education

International Association of Advanced Materials, IAAM's activities for 'Materials Global Excellence' revolve around fostering collaboration, inspiring innovation, and recognizing exceptional achievements in the pursuit of sustainable materials. Through R&D World Links, IAAM conducts research, innovation, and technological development and educates through two institutions: Institute of Advanced Materials and Institute of AI and Robotics, both located at Ulrika, Östergötland, Sweden. IAAM's mission is to accelerate the development of sustainable materials and to shape a future that places a premium on environmental stewardship and resource efficiency through its many internal initiatives including R&D, innovation, education, etc.

R&D world links

IAAM promotes sustainable materials research and development. IAAM world R&D decentralized initiatives are based on the belief that collaborations inspire translational innovation by enhancing new methods and technologies in materials sustainability, health, energy, and the environment. To bolster and facilitate the interdisciplinary participation of global researchers and scientists in Translational Research & Innovation activities, the Institute of Advanced Materials has established a network of R&D labs and decentralized facilities. The institute serves as a hub for health, energy, and environmental research by coordinating translational research projects and bringing together a wide range of subject experts: <https://iaam.se/translational-research>. The decentralized Labs allow expert scientists from all over the world, having a set of resources, and data to collaborate efficiently and work on prolonged R&D projects.

Aims, objectives, advocacy, and policies

Our network of decentralized facilities, R&D World Links, and consortiums is aimed at supporting innovative research projects and partnerships. For a sustainable and climate-neutral future, the Institute serves as the central coordinator for a number of related consortia, expert groups, and translational research programs. IAAM's mission is to shape policies that encourage the use of sustainable practices and foster the growth of a circular economy by providing scientific insights and expertise. IAAM works with policymakers, industry leaders, and stakeholders to promote sustainable materials through below initiatives:

- Networking
- Finding solutions
- Generating results
- Develop policies
- Creating collaborations
- Mapping out future
- Intensive discussions
- Managing consortium

Multi-lateral collaborations, partnerships, and consortiums

IAAM members network and collaborate to foster partnerships, research consortia, and joint projects to address sustainability issues and innovate. Our

decentralized facilities and consortiums act as global interface centers and incubators for ideas to develop into products. The Institute R&D World Links promotes translational research and innovation by bringing diverse expertise together. Institute of Advanced Materials forms consortia and projects that hold the potential to transform the future. IAAM welcomes diverse collaborations.

Educational initiatives

The Institute of Advanced Materials and the Institute of AI and Robotics prioritize sustainable materials education and training. Workshops and seminars train materials scientists and engineers. Scientists, engineers, and researchers must fund, collaborate, and share knowledge.

Institute of Advanced Materials

The Institute of Advanced Materials was founded in the year 2015 with collaborative attempts of the International Association of Advanced Materials. The institute has been working to empower industries and startups by translating research and innovation. We offer services that are highly focused on advanced R&D, innovations, and net-zero technologies. Institute of Advanced Materials works to promote translational research & innovations in the sectors of health, energy, environment, and many more.

Institute of AI and Robotics

Institute of AI and Robotics offers its technological innovation services in AI-enabled smart technologies. The institute hosts a consortium to discuss the issues. AI-enabled Smart Healthcare is now a major research area. Institutes use IAAM technocrats and healthcare experience to develop robotics industry ideas.

Interactive global materials community

The objective of the IAAM organization is to rapidly advance the field of advanced materials by bringing together all current and future scientists under one umbrella. Since its inception, IAAM has been striving to establish an extremely interactional global community (**Fig. 5**). IAAM has organized thematic sessions on all five continents (America, Europe, Asia, Australia, and Africa) to facilitate discussions and planning on nanomaterials, functional, environmental, structural, and composite materials for high-tech applications. Meetings and symposiums held worldwide focus on recent trends and promote profound awareness in various areas, such as Electronic, Magnetic, Optical, Nano, Bio, Green, Quantum, Engineering, Smart, Functional, Interface, Electrolytic, Tissue Engineering, Energy, Healthcare, Devices, and more. IAAM conducts advanced materials conferences, symposia, meetings, training, and workshops through the initiatives below:

Advanced Materials Congress (AMC)

An international platform with unparalleled prestige for academia and industries to indulge in extensive scientific discussions to establish a highly interactive Advanced Materials Community. Ten years of its establishment, Advanced Materials Congress has actively created a global forum straddling across Europe, Asia, Australia, Africa, and America to achieve together the agenda of the decade, 2030, 'The Advancement of Materials for a Sustainable and Greener World'. Up to 2023 April AMC assemblies, IAAM conducted 53rd assemblies of this congress.



Fig. 5. IAAM works in multiple interdisciplinary areas through cross-disciplinary discussions and consortium models with experts. The IAAM consortium, congresses, and symposia bring the advanced materials community together to solve pressing problems through innovation and cooperative efforts. These platforms foster complementary cooperation and facilitate the exchange of ideas among experts.

Baltic Conference Series (BCS)

BCS is a comprehensive forum meant to showcase the latest trends in Climate Neutral Research, Innovations, and Technology across various sectors. The forum calls biannual meetings on the Baltic Sea to discuss the advancements of smart innovation and technology for a clean and sustainable society. The motto of BCS is to promote “Climate Neutral R&D and Green Tech”. In 2023, IAAM celebrates the 7th Anniversary of the BCS.

World Congress Series (WCS)

An International Scientific Carnival to create cross-disciplinary World R&D Links and consortiums in Health, Energy, and Environment. In the ten glorious years of its establishment, the International Association of Advanced Materials (IAAM) in its initiative of World Congress Series (WCS) has taken the prestigious conferences to different parts of the world to stimulate and ignite the interest of advanced science and technology in the local population of different areas to achieve the goal of a building a sustainable world for the future generation.

Advanced Materials Lecture Series (AMLS)

AMLS is an onsite and online hybrid open-ended lecture series aimed at promoting open and informed discussions on issues pertaining to Advanced Materials Science, Engineering & Technology and encouraging scientists to address the social aspects of their research. All the lectures of the series are recorded for possible publication in the open-access audio video literature, Video Proceedings of

Advanced Materials. IAAM has a rich legacy of world-renowned high-profile scientists who have delivered talks in the Advanced Materials Lecture Series.

These events provide a platform for experts to discuss awareness, knowledge, problems, and potential solutions. IAAM has analyzed significant findings, limitations, and prospects in climate neutrality and circular sustainability strategies.

Decadal milestone and pace of excellence

IAAM has surpassed a decade of extraordinary and tremendous advancements in the field of advanced materials. It has become a global leader in publication, networking, materials R&D, and education through cooperation and collaboration. IAAM's Advanced Materials Congress has set the bar for academia and industry with its innovative format and timely themes. As part of our commitment to global excellence, IAAM is forming councils to address the health, energy, and environmental applications of advanced materials. IAAM recommends nanotechnology, cross-disciplinary work, and global collaboration to accelerate the transition to a sustainable future. The International Association of Advanced Materials (IAAM) released its 13th Annual Book during the UN 2023 Water Conference at the UN headquarters in New York on March 22. The 13th Annual Book of the IAAM (ISBN 987-91-88252-39-5) details the association's work in line with the UN SDGs agenda. **Fig. 6** demonstrates IAAM delegates releasing the IAAM decadal activities in accordance with global Sustainable Goals for Materials advancement and a green world.

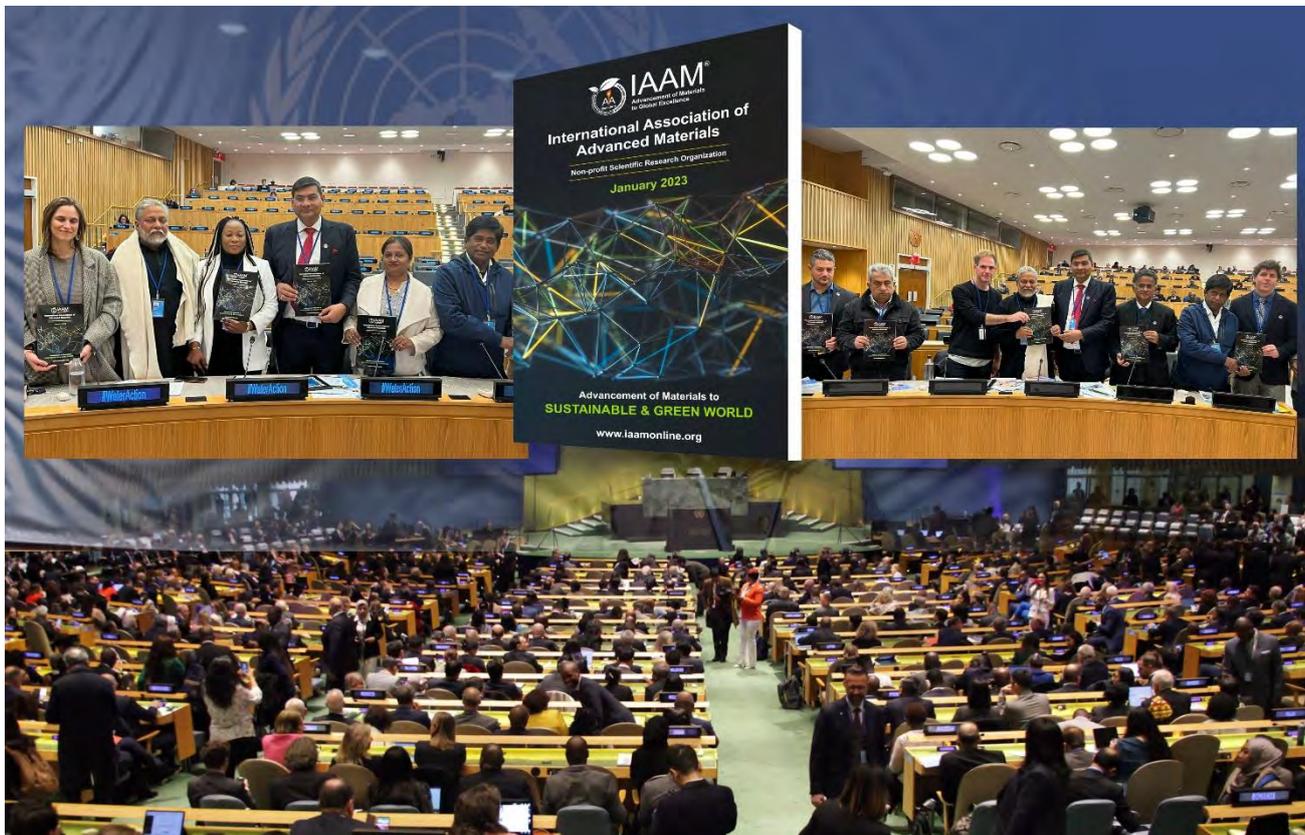


Fig. 6. IAAM decadal activities in accordance with the global Sustainable Goals for Materials advancement and a green world. IAAM released its 13th Annual Book (ISBN 987-91-88252-39-5), detailing the association's work in line with the UN SDGs agenda, during the UN 2023 Water Conference at the UN headquarters, New York on 22 March 2023 [40]

PROGRESS AND INDICATORS FOR THE SUSTAINABLE DEVELOPMENT GOALS

Indicators and reports on the progress towards achieving the Sustainable Development Goals in 2023 will provide valuable insights into the current status of the world and the necessary actions to make the 2030 Agenda for Sustainable Development a reality. These reports track regional and international development progress across each of the 17 SDGs, using in-depth analyses of selected indicators. To ensure the success of the SDGs and drive meaningful progress for people and the planet by 2030, a global indicator framework is essential.

The Sustainable Development Goals Report 2022, using the most up-to-date data and estimates, offers a comprehensive overview of the implementation of the 2030 Agenda for SDGs. The report highlights areas such as food and nutrition, health, education, the environment, and security, which are impacted by climate change and war. Each year, the United Nations Department of Economic and Social Affairs (UN DESA) compiles the latest estimates and data from over 200 countries and territories to produce the SDG Report.

Climate change, COP report, action: The COP26 report urges governments and policymakers to act quickly to address climate and health crises. Global climate action strategies aim to drive ambition, deliver action, and ensure accountability by fostering collaboration in the implementation of transformative change. Given that the world is at a tipping point concerning climate issues, the outcomes of COP 27 focus on addressing the adaptation gap, strengthening resilience, and establishing

interconnected action priorities. The SDGs require adaptation, resilience, and climate action finance. Accelerating holistic zero-carbon development, leveraging nexus areas, tailoring to local and regional conditions, and providing managed financed transitions are considered best practices. Other key aspects include tracking and reporting progress, establishing economic ground rules, and building credibility and accountability.

Priorities for reforming the financial sector: The United Nations SDG report for 2023 outlines six priorities for reforming the financial sector, including SDG investments, sustainability metrics, banking, sustainable finance, national planning, regulation, reporting, oversight, and the development of new mechanisms to enhance international cooperation's quality and the effectiveness of the SDGs. Although some progress was made globally toward achieving the SDGs between 2015 and 2019, these efforts are deemed insufficient. Even in countries largely responsible for climate and biodiversity crises, progress on environmental and biodiversity goals, such as SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), SDG 14 (Life Below Water), and SDG 15 (Life on Land), is slow. To achieve the SDGs, the global community needs to increase the overall amount invested and change the current investment practices. The SDG index report ranks 116 countries based on their efforts to achieve all 17 SDGs, with the top 10 countries predominantly located in northern Europe - Scandinavia, while nations in central Africa record the lowest scores [60].

The Sustainable Development Solutions Network (SDSN): It is an international coalition of organizations that pool their scientific and technological resources to advance the implementation of the SDGs and the Paris Climate Agreement. The SDSN was established in 2012 to unite research institutions worldwide in support of the SDGs. Currently, over 1,900 institutions, primarily universities, are connected through the SDSN's global network, consisting of 53 national and regional chapters. The SDSN facilitates discussions on SDG implementation at the international, regional, and national levels by providing evidence-based pathways and analytics. SDSN will continue working diligently to encourage governments, businesses, and civil society across the world to adopt and align with the SDGs.

INFLUENTIAL POLICIES AND COUNTRIES

To understand the progress made in sustainable development, it is important to delve into the influential policies and approaches adopted by various countries and groups. The SDSN's global survey provides insights into government efforts and commitments towards the SDGs, highlighting key differences across nations, including those in the G20, BRICS, SARC, and African countries groups, in terms of their SDG strategies and dedication.

The Group of Twenty (G20): It consists of major economies such as Argentina, Australia, Brazil, the European Union, France, India, Indonesia, Italy, Japan, Canada, China, Mexico, Russia, Saudi Arabia, the United Kingdom, South Africa, South Korea, Turkey, the United States, and Germany. The G20 focuses on discussing and formulating influential action plans encompassing policies and financial measures.

The European Commission: It adopts a holistic approach in collaboration with the United Nations to foster a better, safer, and more sustainable world for all. Sustainable development is established as a fundamental principle and primary goal in all EU policies, both domestically and internationally. The EU and its Member States are committed to implementing the 2030 Agenda for Sustainable Development. They have also introduced climate, energy, transport, and taxation policies to mitigate environmental degradation, combat climate change, and reduce greenhouse gas emissions by 55% from 1990 levels by 2030.

The European Green Deal: It encompasses a wide range of initiatives aimed at improving the present and future well-being of society. It focuses on various aspects such as clean air, water, soil, biodiversity, energy-efficient buildings, healthy food, clean transportation, cutting-edge clean technologies, recycled products, resilient employment, and training in the industry. The European Union (EU) aims to achieve a climate-neutral continent by 2050 through its focus on clean energy, environmental protection, sustainable agriculture, eco-friendly transport, green industrial strategies, research, innovation, and sustainable investments. By analyzing the influential policies and strategies of countries and groups like the G20, BRICS, SARC, and African countries, and considering initiatives like the European Commission's holistic approach and the European Green Deal, we can gain valuable insights into global efforts towards sustainable development.

GLOBAL MATERIALS POLICY

Through knowledge-sharing and dialogue, IAAM aims to develop strategies that leverage innovation in materials to combat climate change, address resource scarcity, improve water treatment technologies, and promote inclusive education for a more sustainable and equitable world.

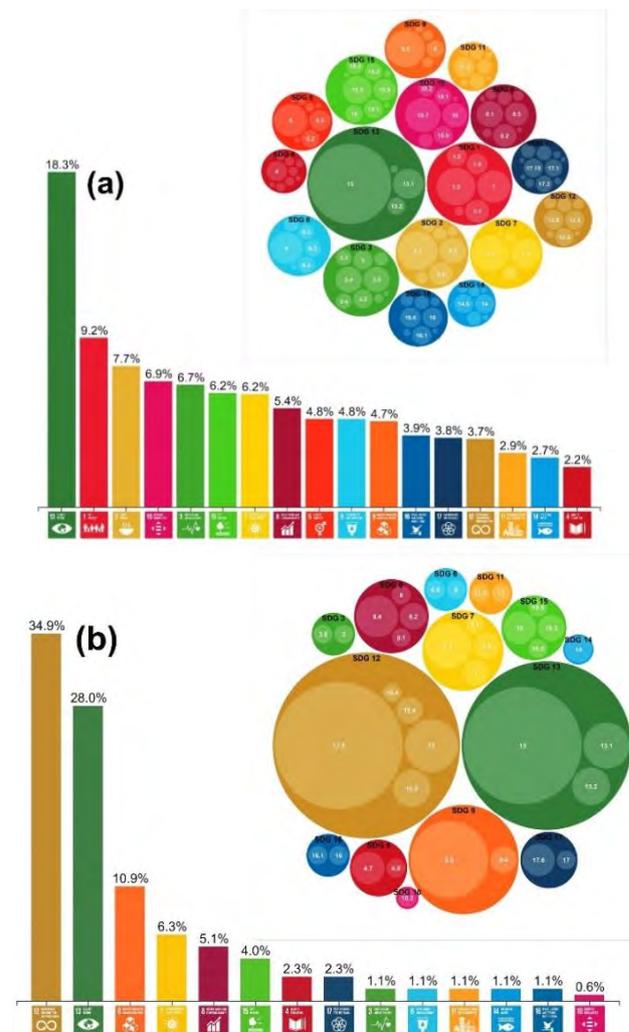


Fig. 7. (a) The work of the UN encompasses the delivery and strategies in numerous interconnected and transdisciplinary fields of materials science and technology, which establish the domains of sustainable materials. This SDG mapping has been carried out using the JRC SDG Mapper, developed by the Joint Research Centre of the European Commission. (b) The delivery and strategies of the International Association of Advanced Materials (IAAM) define the domains of sustainable materials in multi-inter-transdisciplinary areas of materials science and technologies. This SDG mapping has been conducted using the JRC SDG Mapper, developed by the Joint Research Centre of the European Commission.

Global relevance of sustainable materials: In order to fulfill carbon reduction commitments and address the issue of sustainable materials, the United Nations and affiliated organizations engage in monitoring and follow-up activities. Adopting low-emission materials, working towards greenhouse gas reduction targets, and implementing production methods that decarbonize emissions from materials are essential for achieving global sustainability. **Fig. 7(a)** defines the indicator numbers, SDG targets, and their descriptions. Analysis with JRC SDG Mapper reveals that the United Nations report for 2023 identifies the top ten SDG progress in the following order:

SDG 13, SDG 1, SDG 2, SDG 10, SDG 3, SDG 15, SDG 7, SDG 8, SDG 5, and SDG 6 respectively [65]. The United Nations' top 10 progress in SDGs is observed in the following goals in decreasing order:

- Goal 1: No poverty
- Goal 2: Zero hunger (No hunger)
- Goal 3: Good health and well-being
- Goal 5: Gender equality
- Goal 6: Clean water and sanitation
- Goal 7: Affordable and clean energy
- Goal 8: Decent work and economic growth
- Goal 10: Reduced inequality
- Goal 13: Climate action
- Goal 15: Life on land

Realms of sustainable materials: IAAM is deeply invested in the sectors of Energy, Environment, and Health. Making optimum usage of the sphere of Advanced Materials and pushing the boundaries of technology and innovation. Developing goals and resources that support Sustainable Development is essential if we are going to achieve the SDGs on time (source: <https://iaam.se/sustainable-materials>). IAAM's monitoring of comprehensive progress in SDGs to achieve the 2030 Agenda holds global relevance. The top 10 SDG agendas currently focused on by IAAM activities belong to SDG 03, SDG 04, SDG 06, SDG 07, SDG 09, SDG 11, SDG 12, SDG 13, SDG 15, and SDG 17.

Together, we can accelerate the adoption of sustainable materials, advanced global sustainability goals and create a

world that thrives on responsible resource management and environmental stewardship. Nanotechnology, interdisciplinary collaborations, and international cooperation can accelerate progress toward a sustainable future. **Fig. 7(b)** and **Table 1** define the indicator numbers in order and SDGs targets, along with their descriptions. Analysis with the JRC SDG Mapper shows that IAAM activities mostly focus on the top ten SDG progress in SDG 12, SDG 13, SDG 9, SDG 7, SDG 8, SDG 15, SDG 4, SDG 17, SDG 3, SDG 6, respectively. Below are the ten SDGs for which the most progress has been reported by IAAM:

- Goal 3: Good health and well-being
- Goal 4: Quality education
- Goal 6: Clean water and sanitation
- Goal 7: Affordable and clean energy
- Goal 8: Decent work and economic growth
- Goal 9: Industry, Innovation, and Infrastructure
- Goal 12: Responsible consumption and production
- Goal 13: Climate action
- Goal 15: Life on land
- Goal 17: Partnership for the goals

Intriguingly, the IAAM's top five priorities—sustainable consumption and production, climate action, industry, and innovation, affordable and clean energy, and decent work and economic growth—all fall under the umbrella of the organization's "Advancement of Materials to Sustainable and Green World" agenda for the decade beginning in 2030.

Table 1. Indicator numbers in order and SDGs targets, along with their details.

Indicator number and SDG	Target and indicator description
12.5.1,12,12.5	National recycling rate, tons of material recycled
9.5.1,9,9.5	Research and development expenditure as a proportion of GDP
9.5.2,9,9.5	Researchers (in full-time equivalent) per million inhabitants
7.2.1,7,7.2	Renewable energy shares in the total final energy consumption
13.1.1,13,13.1	Number of deaths, missing persons, and directly affected persons attributed to disasters per 100,000 population
13.1.2,13,13.1	Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework 2015-2030
13.1.3,13,13.1	The proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national strategies
8.4.1,8,8.4	Material footprint, material footprint per capita, and material footprint per GDP
8.4.2,8,8.4	Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP
12.2.1,12,12.2	Material footprint, material footprint per capita, and material footprint per GDP
12.2.2,12,12.2	Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP
13.2.1,13,13.2	Number of countries with nationally determined contributions, long-term strategies, and national adaptation plans
13.2.2,13,13.2	Total greenhouse gas emissions per year
4.7.1,4,4.7	The extent to which education for global citizenship, sustainable development, national education policies, and teacher training involved
17.6.1,17,17.6	Fixed Internet broadband subscriptions per 100 inhabitants, by speed
7.3.1,7,7.3	Energy intensity measured in terms of primary energy and GDP
8.2.1,8,8.2	Annual growth rate of real GDP per employed person
9.4.1,9,9.4	CO2 emission per unit of value added

12.4.1,12,12.4	Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals
12.4.2,12,12.4	Hazardous waste generated per capita and proportion of hazardous waste treatment
15.3.1,15,15.3	The proportion of land that is degraded over the total land area
3.9.1,3,3.9	Mortality rate attributed to household and ambient air pollution
3.9.2,3,3.9	Mortality rate attributed to unsafe water and lack of sanitation and hygiene
3.9.3,3,3.9	Mortality rate attributed to unintentional poisoning
4.5.1,4,4.5	Parity indices (female/male, rural/urban, bottom/top wealth quintile and others disability status, indigenous peoples, conflict-affected)
6.5.1,6,6.5	Degree in integrated water resources management
6.5.2,6,6.5	The proportion of transboundary basin area with an operational arrangement for water cooperation
7.1.1,7,7.1	The proportion of the population with access to electricity
7.1.2,7,7.1	The proportion of the population with primary reliance on clean fuels and technology
8.1.1,8,8.1	Annual growth rate of real GDP per capita
10.2.1,10,10.2	The proportion of people living below 50 percent of median income, by sex, age, and persons with disabilities
11.2.1,11,11.2	The proportion of the population that has convenient access to public transport, by sex, age, and persons with disabilities
12.8.1,12,12.8	The extent to which education for (i) global citizenship, SDGs (a) national policies, curricula, teacher and student assessment done
15.2.1,15,15.2	Progress toward sustainable forest management
15.5.1,15,15.5	Red List Index
16.1.1,16,16.1	Number of victims of intentional homicide per 100,000 population, by sex and age
16.1.2,16,16.1	Conflict-related deaths per 100,000 population, by sex, age, and cause
16.1.3,16,16.1	The proportion of the population subjected to (a) physical violence, (b) psychological violence, and (c) sexual violence in the previous 12 months
16.1.4,16,16.1	Proportion of population feels safe walking alone around the area they live

Responsible consumption and production: IAAM is focusing on Sustainable Development Goal 12, which emphasizes responsible consumption and production. Recognizing the importance of materials in advancing sustainable development, IAAM will facilitate an innovation activity aimed at deepening our understanding and fostering actionable insights in these areas. This activity will bring together industrial researchers, leaders, educators, policymakers, and practitioners to explore the intersection of materials science, natural conservation, and educational initiatives.

Climate action through carbon-neutral systems: IAAM believes that carbon-reducing sustainable heating systems are essential for understanding the future. IAAM leads a zero-carbon heating technology project with leading experts and industry pioneers. This project aims to explore a possible future where carbon-neutral heating is achieved using renewable energy and cutting-edge materials. In line with the emphasis of SDG 13 on climate action, IAAM has prioritized this topic for the next decade through research, innovation, and education.

Materials for sustainable and innovative solutions: Nanotechnology offers a granular level of control over matter, presenting an opportunity for sustainability research. Industry, innovation, and infrastructure are the focus of Goal No. 9. IAAM's consortiums and council provide a forum for academics, scientists, and business leaders to network, discuss advancements in the field, and collaborate on the development of game-changing

technologies. Nanomaterials, nanodevices, and nanosystems have the potential to enable sustainable solutions that increase energy efficiency, allow for cleaner production processes, and enhance healthcare delivery.

Affordable and clean energy: Ensuring universal access to affordable, reliable, and up-to-date energy services under a sustainable model can improve the environment. This goal can be achieved by increasing funding for research and development of clean energy sources such as renewables and energy efficiency measures, as well as by encouraging investments in these resources. SDG 7 focuses on providing access to reliable, low-cost, and renewable energy while improving the capacity of the energy sector to meet global demand. IRENA's World Energy Transitions Outlook demonstrates that a climate-safe future is possible. By utilizing electrification, efficiency, renewables, hydrogen, and sustainable biomass, the 1.5°C pathway accelerates the global energy transition. By the second half of this century, the energy sector must transition from fossil-based to zero-carbon sources to mitigate climate change and limit global warming to 1.5°C above pre-industrial levels. Advanced computational setups with machine learning, data analytics, and cloud systems aid in clean energy data processing and monitoring. Integrating technology into energy research and innovation supports investment and policy decisions. Technology helps customers reduce costs, risks, and carbon emissions, while green technologies create renewable energy jobs. IAAM's efforts in developing new aspects of innovation, management, energy sources, performance,

societal behavior, and infrastructure have resulted in affordable and clean energy.

Materials circularity and economic growth: The SDG Knowledge Hub provides daily updates on the 2030 Agenda for Sustainable Development, including articles, blog posts, and event listings. Government agencies can mandate recycled content and encourage raw material substitution by recycling plastics, synthetic fibers, paper, wood, and byproducts. Multilateral Environmental Agreements (MEAs), such as the Stockholm and Minamata Conventions, regulate global contaminants like persistent Organic Pollutants (POPs) and mercury. The Strategic Approach to International Chemicals Management (SAICM) focuses on reducing and eliminating environmental risks, such as lead in paint, harmful chemicals, knowledge, and stakeholder engagement. SAICM has published a report detailing actions and recommendations on circularity in the electronics sector in Central and Eastern Europe (CEE). Circular Economy for the Electronics Industry in Central and Eastern Europe evaluates current practices and suggests improvements for electronic product end-of-life waste. Roadmap to a circular economy in electronics considers product design, manufacturing phases, materials of concern, durability, reparability, recyclability, and reusability patterns. Working toward economic growth in line with SDG 8 involves reducing unnecessary materials production.

Policy and climate pledges for a green world: IAAM urges the materials community to renew its commitment to excellence and sustainability to reconnect our transition to restoration. By prioritizing environmentally friendly practices, resource efficiency, and responsible material sourcing, we can create a green world where materials are designed, produced, and utilized sustainably. IAAM actively promotes and recognizes initiatives that demonstrate a strong dedication to environmental stewardship, circular economy principles, and social responsibility. Over the past decade, IAAM has made massive efforts in facilitating significant climate-neutral research for the end user. Together, we can harness the power of nanotechnology, foster interdisciplinary collaborations, and nurture international cooperation to accelerate progress toward a sustainable future. We invite you to join IAAM's policy, climate pledges, and specialized councils, and contribute your knowledge, insights, and passion toward shaping a sustainable world. To become a part of the most vibrant community of Advanced Materials researchers in the World membership is open on a digital portal. Your contributions go a long way towards building the scientific community of tomorrow through donation. Important events and news circulated through blogs and newsletters. Overall, IAAM invites the materials community to participate in these transformative activities and contribute expertise, insights, and innovations to shape the sustainable future of our planet.

Emergence of R&D World Links for Decentralized Facilities and International Cooperation

The United Nations Sustainable Development Goals (UNSDGs) and the European Green Deal (EGD) are two examples of global sustainability initiatives that trust strongly on research and development (R&D) activities to achieve their targets. This article explores the synergies between R&D world links and decentralised labs, highlighting their capacity to foster sustainable innovations through international collaborations and the exchange of ideas. Climate efficient materials research is key element of sustainable ambition and distributed facilities offer a better chance of leading circular technology for green world. The participation from developed and developing countries in the area of clean R&D are needed to be promoted through multi folds cooperation. The worldwide industrial R&D utilizes cluster research collaboration which should be focused on net-zero innovation for raising product technology readiness levels (TRLs). In addition, advancements in the green know-hows are helpful in deciding the direction of technology development and transition for climate neutral infrastructures.

INTRODUCTION

Global sustainability efforts, such as the United Nations Sustainable Development Goals (UNSDGs) and the European Green Deal (EGD), rely heavily on research and development (R&D) activities. This article provides an overview of the International Association of Advanced Materials (IAAM)' networking-based R&D upgrade to the global stage. IAAM focus on the information and communication flows that play a part in this relationship. R&D focus on advancement of materials to get

sustainability is best strategies to achieve the sustainability. Recently there is an increase in the number of inter-organizational research links and ventures, the use of computer-communication networks, and the globalization of R&D, among other developments. Recent developments in R&D, however, have been argued to be upsetting the delicate balance between the role of organizations and locations in the research process.

The convergence of R&D world links and decentralized facilities has opened up new channels for advancing the cause of sustainable development. This

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occurs at a time when the global community is working hard to tackle problems like climate change, environmental protection, and equitable development. IAAM's goal with these platforms is to spark conversations about the latest developments in materials science, which could make a big difference in achieving the UNSDGs and EGD. This article delves into how R&D world links and decentralized facilities can work together for mutual benefit, highlighting their ability to promote long-term innovation through teamwork and the sharing of knowledge. It is speculated that in the 2023 and beyond, these changes will have a major effect on the structure and location of corporate R&D activities. The vast potential of these platforms in fostering revolutionary breakthroughs for a more sustainable future

is the focus of our analysis of successful case studies and solutions to difficulties.

Advances in state-of-the-art technology

R&D results new products and services, creates production and application methods, and tests them for efficacy and safety. Research and development are the innovative activities undertaken by corporations, organisations, educational institutions of private or governments to develop new products and services and improve existing ones [5]. R&D based in the worldwide coverage are responsible for substantial contribution in the world's total industrial development and bring climate neutral perspective earlier (Fig. 1).

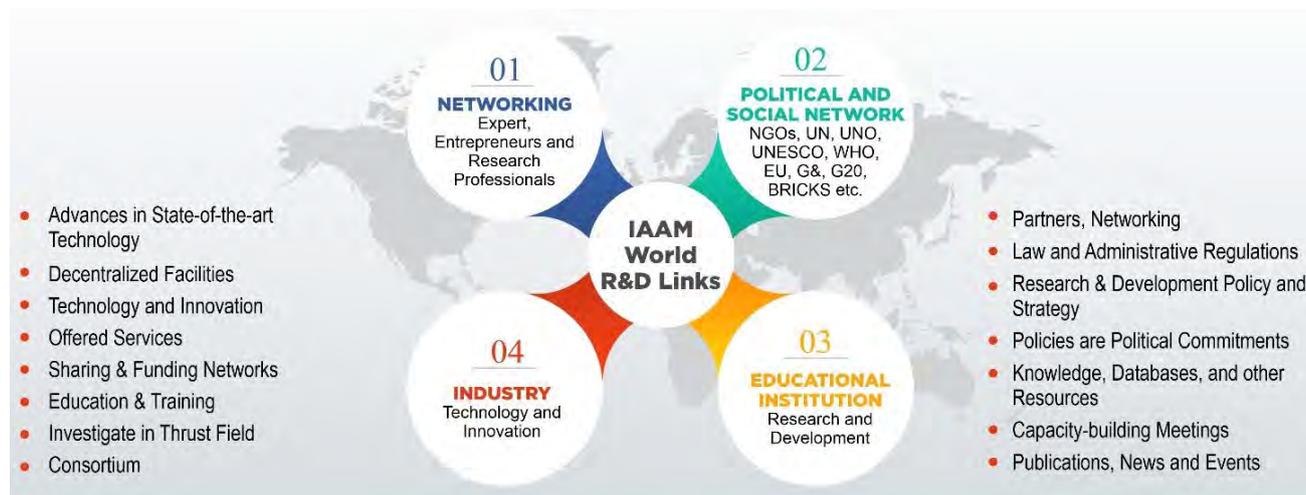


Fig. 1. Worldwide coverage can contribute in the industrial development in research and technology and bring sustainability.

Research and development share of substantial Gross Domestic Product (GDP) for R&D in the public, private and government organisations to develop new methods and applications. EU industrial innovation commitments determine the region's competitiveness. COVID-19 recovery, the twin green-digital transition, and the global sustainability agenda have elevated its importance.

The Nordes team's involvement in subsequent R&D projects increases the offer of innovative devices that meet our partners' and customers' needs. Expert teams and cutting-edge technology grow research and department. This work improves service and customer satisfaction. Several pillars support R&D including curiosity for the issues, networking and cooperation and reliability.

Synergies between R&D World Links and decentralized facilities

Collaboration and innovation between R&D World Links and decentralized system may shape a sustainable future. These two interconnected platforms create a dynamic environment for solving the UNSDGs and EGD's worldwide concerns. Synergies improve collaboration and knowledge sharing. R&D World Links unites researchers, specialists, and institutions worldwide. This helps solve difficult sustainability issues that require interdisciplinary approaches by combining multiple viewpoints, experience, and best practices. Decentralized facilities provide local innovation centres, enabling communities to contribute to sustainable development in ways that fit their needs and environments. Researchers and entrepreneurs can access a

broad skill pool and knowledge base by using both platforms. Sharing ideas and experiences fosters a global collaborative culture by cross-fertilizing new solutions and spreading successful practices. R&D world links and decentralized facilities improve financing and resource access. Due of their dedication to global sustainability, governments, businesses, and non-profits invest in these platforms. Pooling resources lets ambitious ideas and sustainable efforts scale up. This symbiotic relationship exponentially increases technological and systemic innovation. Using artificial intelligence (AI), blockchain, and renewable energy solutions in R&D World Links and decentralized facilities advances sustainable practices.

FRAMING INTERNATIONAL R&D COOPERATION

Discovering current and forthcoming funding opportunities for research, as well as potential research partners, jobs, and fellowships through European Union research and innovation system facilitates research development more. Gain an understanding of research initiatives and their outcomes, collaborative research projects, and EU initiatives to foster innovation.

The ability to fund projects is a key feature which involved -

- Partners, networking
- Law and administrative regulations
- Investigate in each field
- Research and development policy and strategy

- Knowledge, including books, databases, and other resources
- News and Events

European Union Region

European Union (EU) based companies are responsible for twenty percent of the world's total industrial investment in research and development. During the past decade, when total industrial R&D investment around the world increased by 68%, the EU has maintained its position as the second-best region in the world for investment from the private sector in research and development. IAAM was the organization that initially developed the empirical and theoretical underpinnings of this R&D. To continue, this is a policy review regarding networking within the organization. Thirdly, it offers a space for a number of recently completed projects to be displayed. These analyses can shed light on policy patterns as well as research foci that need to be addressed.

European cluster collaboration platform

European Cluster Collaboration Platform (ECCP) is Cluster organisations for stakeholders and considered as European online hub for cluster stakeholders (organizations, policymakers, and their ecosystem) and the reference third-country stakeholders seeking partnerships with European counterparts for better future. Collaboration strengthens Europe's economy. Organisations aim to boost Europe's economy and industry, particularly SMEs, by improving productivity, innovation, internationalization, and resource efficiency. Clusters are regional ecosystems of related industries and competences with many inter-industry interdependencies. Cluster organizations are legal entities that support innovation cluster cooperation, networking, and knowledge by delivering adapted business facility to enhance novelty, especially in SMEs. They usually enable strategic cluster partnering.

The services of the ECCP include:

- Largest information hub via ECCP newsletter.
- Webinars, capacity-building seminars, and conferences matchmaking events to promote cluster cooperation in Europe and beyond.
- Knowledge and information of database mapping for regional to international, networks, and publications developed by the ECCP, European Commission, academia, and bigger society.
- Sharing and funding networks
- Cluster organizations can find partners and use Cluster Xchange to privately exchange offer and demand.
- International cooperation pages with strategic country profiles and technical assistance (Small and Medium-sized Enterprises Go International).
- European Commission policy updates on green world and digitalization, social economy resilience, and industrial ecosystems for better future.
- Cluster policies are political commitments to strengthen existing clusters and encourage new ones.

Globalization and evolution of industrial R&D

Technology-based firms must constantly amend their R&Ds due to globalization, regionalization of scientific

expertise, and rapid technological alteration. Technology companies' knowledge creation processes are globalizing but still limited to a few countries. Thirty-three multinational businesses were categorized into five R&D organizational types Multinational Corporations (MNCs), R&D hub, integrated R&D network, ethnocentric centralized, geocentric centralized, and polycentric decentralized organizations are included. The distribution of R&D activity and unit cooperation determined the classification. Many centralized R&D companies are internationalizing. They realized their R&D processes must better meet international market needs.

Developing countries

Research and development that is conducted internationally can help developing countries by improving their domestic Scientific and Technological (S&T) capacities. Accordingly, S&T competitiveness by fortifying domestic inventive capacities.

DECENTRALIZATION FOR SUSTAINABILITY ATTAINMENT

IAAM R&D World Links and decentralized network facilities are committed to support innovative research projects and facilitating collaboration. Our ultimate objective is to provide a forum where top researchers from all areas of science may meet, share ideas, and collaborate to make substantial strides in Translational Research and Innovations through the R&D World Links platform to achieve UNSDG and EGD. IAAM is the central coordinator for many groups working towards a more sustainable future, including consortia, expert groups, and translational research projects. Our method prioritizes teamwork to guarantee that every aspect of a project receives input from all relevant parties. Through our extensive connections in the academic, research, and corporate communities around the world, we actively encourage research and innovation programs. **Fig. 2** illustrates the operational model of IAAM R&D World Links decentralized network facilities. It's a great example of how IAAM R&D World Links work to foster ground-breaking scientific endeavors and cooperative ventures.

Opportunities and challenges

In the context of UNSDGs and EGD, R&D World Links and decentralized facilities present a wide range of opportunities and challenges. One beneficial aspect of these platforms is that they let researchers and specialists from all over the world work together better, share their findings, and learn from each other's viewpoints. They connect people all over the world, giving them access to an enormous pool of talent and allowing them to establish formidable teams to tackle tough problems like climate change and environmental preservation. In addition, they inspire innovation and research that serves the UNSDGs and the EGD through their emphasis on sustainability.

IAAM roles to address global issues through networking and stakeholders are well recognised at worldwide. The key to successful cross-cultural and cross-time zone collaboration is clear and consistent communication and coordination. R&D World Links and decentralized facilities foster cross-disciplinary interactions

that accelerate the development of innovative solutions to achieve affordable and clean energy, climate action, environmental conservation, responsible consumption, and production. Protecting your intellectual property and making sure your initiative has the resources it needs to make an effect are both very important factors to think

about. Protecting precious intellectual property while it is transferred across international borders necessitates the use of data security and privacy protections. These platforms prioritize sustainability to help the Green Deal reduce greenhouse gas emissions, switch to renewable energy, and promote circular economies.

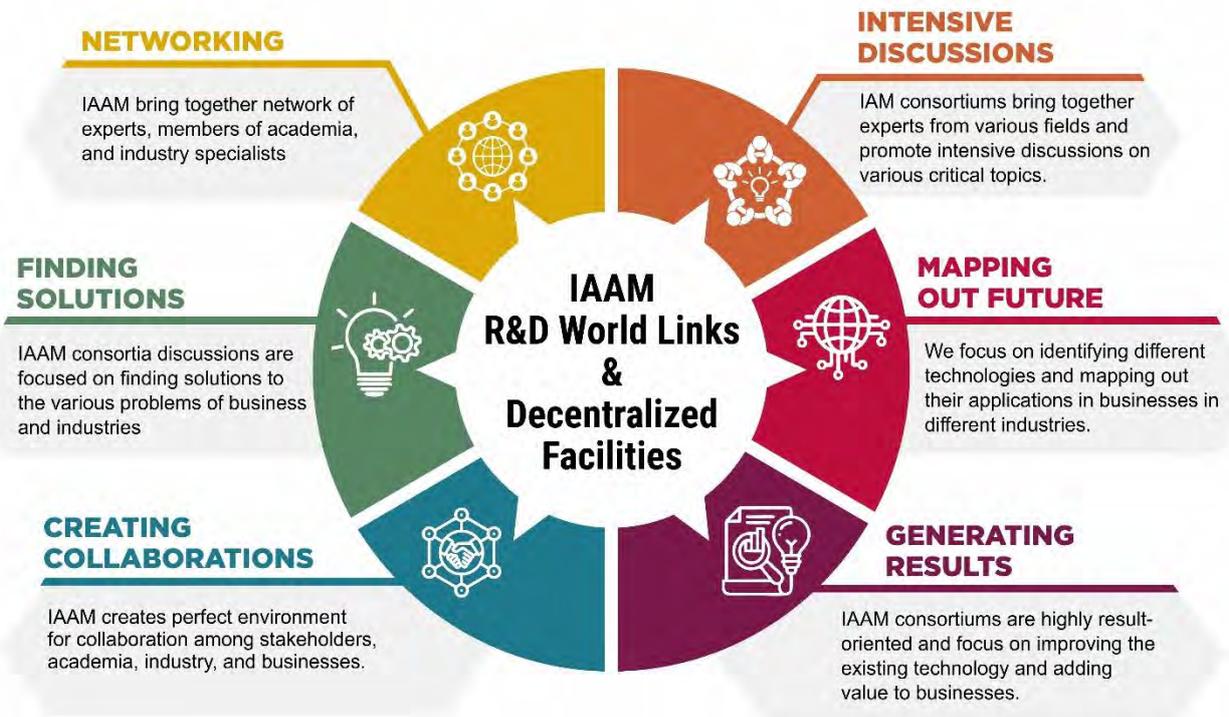


Fig. 2. IAAM Model of R&D World Links and decentralized network facilities.

New horizons for R&D decentralized facilities

Market-oriented R&D, which adapts products to local markets, was linked to the basic companies with production facilities located in a relatively distributed area.

R&D ORGANISATIONS

Since 1999, Research and Technology Organizations (RTOs) in Europe have been promoted by the European Association of Research and Technology Organizations (EARTO). RTOs are non-profit organizations that produce, combine, and bridge knowledge, skills, and infrastructure to conduct research and development with public and industrial partners of all sizes. These activities aim to produce technological and social innovations and system solutions that strengthen their economic, social, and policy impacts. There are currently 350 RTOs operating in 32 distinct countries, which represent approximately 150,000 scientists, engineers, and various types of technicians involved in collaborations with one hundred thousand companies on an annual basis.

EU countries to fund microelectronics R&D

The European Commissions approved a second microelectronics Important Project of Common European Interest (IPCEI) to make the EU greener, digital, secure, resilient, and sovereign. The European state aid assessment will allow EU Member States to invest up to €8.1 billion in research, innovation, and the first widespread use in industry of microelectronics and telecommunication,

materials, chip designs and manufacturing activities. 56 companies—SMEs and startups—will complete 68 IPCEI projects. Austria, the Czech Republic, Finland, France, Germany, Greece, Ireland, Italy, Malta, the Netherlands, Poland, Romania, Slovakia, and Spain are only some of the Member States that worked on the IPCEI ME/CT project and gave notice of it.

European R&D centers of Ericsson

Ericsson has helped Europe innovate since 1876. Ericsson drives the region's digital agenda with 5G, Internet of Things, cloud, and more. Ericsson ready for Europe's future. Ericsson has 21 research and development centers located across Europe, and in each one of those centers, the company works in collaboration with the region's various industries and innovators to put European business in the driver's seat of what comes next. They represent themselves as the number one mobile communication provider in Europe and have more than one hundred different R&D collaborations in Europe. European R&D centers have 60,000 employees and organisation holds 35,000 patents.

Research and development budgets over the past decade were analyzed by way of a comparison study. The Eurostat database was mined for information in order to conduct this analysis covering all 28 EU member states. The structure of research and development expenditure, including a breakdown by the four organisational field: business organization, government, education, and non-profit organizations to better understand the dynamics. Business spends the most on R&D in most EU countries.

European R&D centers and green deal

The European Commission Industrial R&D Investment Scoreboard 2021 is a major global private sector R&D investment research. Huawei performs most worldwide research in Europe and supports the European Green Deal because international research collaboration boosts EU competitiveness and mitigates climate change. Huawei is world's second highest private sector investor in R&D. Huawei opened its first Swedish research center in 2000 and employs 2,400 researchers in 23 European research centers. Huawei's collaborative research modernizes Europe through deeply embedded in Europe's ICT research ecosystem via over 150 university partnerships.

United Kingdom R&D participation for net zero

The United Kingdom (UK) and EU negotiated a deal in December 2020 to allow the UK to participate in Horizon Europe, Copernicus, Euratom Research & Training, and Fusion for Energy under the Trade and Cooperation Agreement. This alliance helps British and European researchers and producers address major social issues. United Kingdom will switch to a new research and development program in the event that it is unable to participate in Horizon Europe, Copernicus, or Euratom, Net zero, pandemic preparedness, and security require research and innovation.

Recognitions for excellence

EARTO hosts several events each year to promote networking and raise the RTO sector's profile. All EARTO members can enter the annual Innovation Awards. It honors EARTO members who contributed to innovations with significant social and economic impact. IAAM Awards and innovation- in materials, engineering and science. An independent jury chooses winners. In October, politicians and stakeholders gather in Brussels to present the prizes. IAAM embarks on this path, it hopes to encourage cooperation, spark creativity, and honor outstanding contributions to the development of eco-friendly materials. The IAAM is quite pleased with its award program because it has been honoring technological advances in materials for more than ten years. IAAM bestows titles like "Laureate," "Fellow," "Medal," and "Scientist" upon these scientists

and engineers in order to recognize their contributions to modern materials research. This award is in recognition of their steadfast commitment, pioneering efforts, and environmental impact and advocacy. Nominations can be submitted from anywhere in the world, and the winners will be honored at next year's IAAM Annual Conference for their achievements. Innovators in the field of materials science are singled out for special recognition with both the Materials Sustainability Award and the Innovation Award. Sustainability and the lasting impact of materials are at the heart of IAAM's efforts to build a global network dedicated to materials excellence. IAAM's goal is to encourage R&D collaborations and partnerships through its membership of over 80,000 people from about 140 countries.

R&D global forum for materials innovation

Sustainability studies can benefit from the fine-grained control over matter that advanced materials provide. Goal No. 9 focuses on the development of productive industries and supporting infrastructure. Consortia and the IAAM Council give researchers, scientists, and business executives a place to meet, share ideas, and work together to create ground-breaking new technologies. Sustainable elucidations that are energy efficient with cleaner production, and improve the delivery of applications in healthcare, energy, and the environment may be made possible by nanomaterials, nanodevices, and nanosystems.

When it comes to bringing together the scientific communities of academia and industry, few venues can match the prestige of the Advanced Materials Congress (AMC). In the ten years since its founding, the Advanced Materials Congress has worked to establish a global forum that brings together experts from all over the world to work toward the shared goal of advancing materials for a sustainable and greener world in the year 2030. As of the August 2023 AMC assemblies, IAAM had presided over 55 such gatherings. The annual Innovation Awards are open to all IAAM members. In a ceremony held annually on a different continent (Europe, Americas, Asia and Australia), it awards prizes to members who have made significant contributions to innovations that have had social and economic impacts. **Fig. 3** shows how the health, energy, and environment sectors were prioritized during the IAAM awards ceremony.

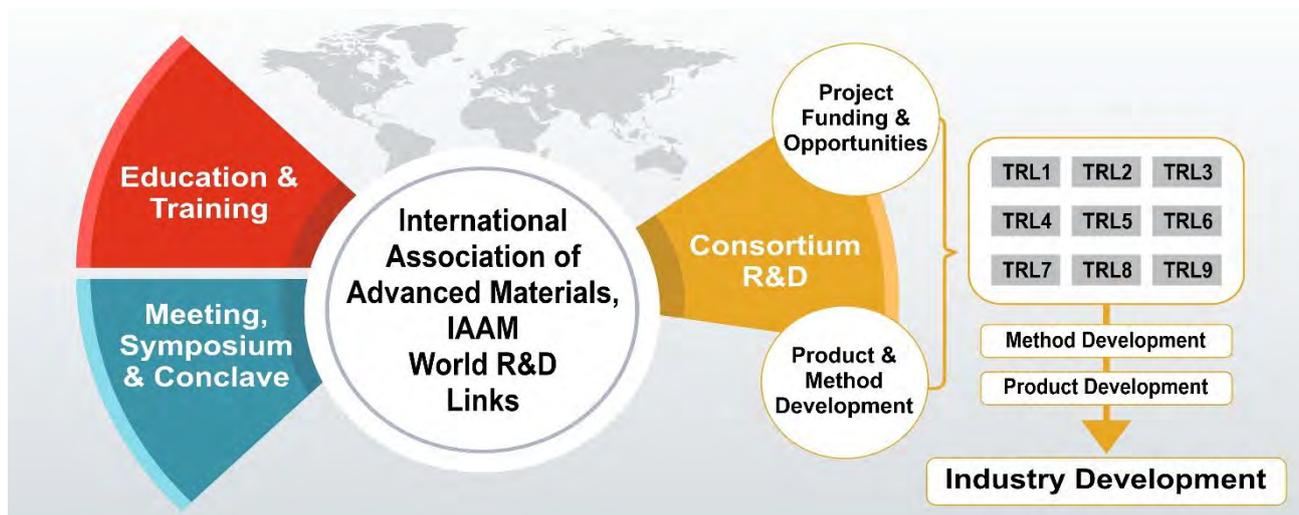


Fig. 3. IAAM award ceremony focus based on R&D for innovation, engineering and technology in materials field via prestigious Advanced Materials Congress.

Technology readiness levels

Technology readiness levels are primarily used to aid management in making technological development and transition decisions. It is just one of several instruments that are essential for monitoring R&D activity within a company. During the attainment phase of a program, TRLs can be used to estimate the level of development of various technologies. Technology Readiness Levels (TRLs) allow for standardized, cross-discipline conversations about technologies' relative levels of development. On the TRL scale, 9 represents the most advanced technology. The EARTO has produced a widely used methodology and discussion of TRLs. The Institute of Advanced Materials (IAM) places a premium on seeing that cutting-edge technologies are widely adopted so that they can be commercialized and used to their full potential. IAM provides support for commercialization efforts by businesses and groups of all sizes. IAM help with the next steps, from coming up with the idea to bringing the finished product to market. In keeping with our commitment to sustainability, we provide training and educational opportunities centered on sustainable practices and principles. Policymakers, professionals, young researchers, students, and industry experts are the target audience for our programs. IAM recognizes the importance of educating and inspiring professionals to work toward a more sustainable future.

WORLD R&D LINK FOR HEALTH, ENERGY AND CLIMATE

R&D connectivity for energy

Climate diplomacy to achieve global eco-neutrality and energy technology transformation to achieve climate neutrality goals. The development of nonrenewable resources such as wind and solar power technologies is regarded as one of many critical explanations to meeting the world's increasing demand for energy. Using nonrenewable resources as an alternative measure is the best way to reduce reliance on fossil fuels, and solar light-based technologies have enormous potential to transform industries. The best way to transform the energy field is to use waste for climate neutral energy production. Advanced technologies and metal-organic frameworks are now extremely useful in the energy sector for energy devices.

Hydrogen is currently driving the green energy future. Hydrogen energy research is a rapidly developing field with the potential to help the world reach its zero-carbon goals.

R&D connectivity for healthcare

The development devices based on microfluidics, as well as advancements in organ-on-a-chip materials, is beneficial to public healthcare. The pharmaceutical sector is under stress from several external factors, such as declining profits because of patent expirations, rising healthcare costs, and tighter regulations. Research and development funds should be directed on improving proof-of-concept through novel drug discoveries and clinical signatures, target selections, etc.

Digital devices are effective for the patient care around the world. Sensors continuously monitor patient systems for speedy diagnosis and intervention. Today, 3D printers, robotics, and drones being studied for precision surgery,

rehabilitation, targeted drug distribution, medical logistics, etc. The IoT able to transform communication with remotely and provide strength to public healthcare. Paper-based analytical device advancements for climate neutral biosensing. Understanding Materials and convergence technologies, Artificial Intelligence, innovation, and their impacts, which can scale Clinical Healthcare with enormous potential is adoptable. Modern therapeutic approaches and technologies developing healthier healthcare management models.

Environmental R&D cooperation

To tackle sustainability issues, businesses increasingly need to collaborate with their partners. Cooperation in environmental R&D can have many positive effects, but its benefits may be curtailed by the complexity of its management. The various sourcing technique used in environmental R&D cooperation can have far-reaching implications, and network connections can help to ensure their success. Today's era of sustainability is focused on new perspectives, rational designs, engineering of materials and assessment of bioproduct for eco-functionality. Advanced Materials and technologies work for carbon neutrality achievement has time bound targets. Prioritizing R&D efforts toward climate neutrality is essential. Important perspective on the challenges and opportunities for climate should be developed based on experimental and theoretical predictions. The IAAM R&D network is largely focused on the positive impact of cooperation. This editorial, represent the effectiveness of health, energy and environmental R&D cooperation to understand and move towards technology transition and create sustainable environment according to UN and IAAM agenda.

IMPLICATION OF NETWORK R&D FOR MATERIALS

Advanced materials technologies will lead to more integrated advanced-materials coordination through customized R&D and innovation, which will be beneficial to international business. The Decade's Journey to Advancing Materials examines a broad transformation of advanced materials technologies. Most companies today run in a networked setting so that they can test out new ways of sharing and integrating data with their peers and ecosystem partners.

The gold thread that connects global businesses, consumers, and other stakeholders is digital connectivity. Connectivity technologies (such as AI, blockchain, cloud, stream, Geographic Information System, IoT, and data analytics) are critical for more efficient material progress. Through the use of networking, the IAAM facilitates international R&D efforts to improve research and development on a global scale.

Advanced materials translational research has a positive impact on health, energy, and the environment, as shown in **Table 1** of the IAAM R&D world link. These cooperation and collaboration will likely have far-reaching effects on how and where businesses conduct their R&D. The role of the IAAM as a connecting link for unlimited organizations created opportunities for collaboration among researchers all over the world.

Table 1. R&D world link focused on innovation and technology perspective in health, energy and environment fields through advanced materials translational research.

R&D Connectivity	Key Area	No. of Researchers	R&D Organisations
Energy	Solar light induced quantum dots	9	5
	Biomass for climate neutral energy production	7	3
	Metal–organic frameworks for supercapacitors	13	8
Health	Next generation biomedical devices	8	6
	Devices for climate neutral biosensing	7	4
	Nanohybrid-based immunosensor	6	6
	Sustainable chemical preventive models	16	14
	Scenario of Pandemic	12	8
	State-of-the-art therapeutic strategies	12	10
	Sustainable healthcare management	7	6
Environment	Electrochemical CO ₂ reduction	12	8
	Swine manure slurry as liquid fertilizer	5	4

FUTURE DIRECTIONS

There has been both slow and rapid progress toward SDG17. The \$34 billion in net bilateral ODA disbursements to African nations in 2022 was a decrease of 7.4 percent from the \$38 billion in 2021. Slower growth in Internet users compared to the peak of the pandemic means that the goal of connecting everyone by 2030 will remain elusive without more investment in infrastructure and digital skills.

There has been no change to the preferential tariff treatment accorded by rich nations to LDCs, SIDs, and developing nations. Over the past five years, it has risen virtually continually.

A new era of quick progress towards reaching the Sustainable Development Goals by 2030 is being pushed for with strategic guidance from political leadership at a prominent level. As the 2030 Agenda and the SDGs approach their halfway point, the President of the General Assembly has called for this Summit. This conference is meant to be the highlight of the High-level Week of the United Nations General Assembly. The SDG Summit will serve as a clarion call for world leaders to gather, assess progress thus far, and commit to increasing their efforts. This is an opportunity to renew our dedication to a future in which no one is left behind. As a result of the 2030 Agenda's success in mitigating the cascading effects of multiple global crises, hope, optimism, and desire have been rekindled with respect to the plan.

As the globe becomes increasingly interconnected, collaborative networks of professionals from many sectors are generating innovation and breakthroughs in R&D. Advanced technologies enable the shift from centralized R&D hubs to be decentralized facilities, which improves adaptability, experimentation, and problem-solving. These



Fig. 4. Future direction of global collaboration and decentralized facilities in shaping the future of research and development.

trends foresee a world where researchers work internationally in real time using decentralized setups to speed innovation, flexibility, localized solutions, and resource efficiency. These trends foster open communication and seamless integration, moving R&D toward a connected, innovative, and impactful future as shown in Fig. 4.

The advancement of the UNSDGs and the EGD relies heavily on R&D World Links and decentralized facilities. These strategies provide chances to address global concerns and speed up sustainable development by encouraging collaboration, information exchange, and localized innovation. To fully realize their potential, however, there must be universal access, consistent regulation, and well-defined environmental goals. IAAM can create a more sustainable and resilient future by capitalizing on the synergies between R&D World Links and distributed facilities.



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IAAM Events Calendar

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23 - 26 September 2023
Southampton, UK

www.advancedmaterialscongress.org/europe



World Conclave on Materials, Energy & Climate

09 - 11 October 2023
Stockholm, Sweden

www.advancedmaterialscongress.org/conclave23



International Conference on Nanomaterials & Nanotechnology

27 November - 02 December 2023
Abu Dhabi, UAE

www.advancedmaterialscongress.org/icnano



World Energy Congress

27 November - 02 December 2023
Abu Dhabi, UAE

www.advancedmaterialscongress.org/world-energy



Advanced Materials World Congress

09 - 12 November 2023
Orlando, USA

www.advancedmaterialscongress.org/world23



International Conclave on Materials, Energy & Climate

18 - 21 December 2023
Delhi, India

www.advancedmaterialscongress.org/conclave



2024

American Advanced Materials Congress

26 February - 01 March 2024
Miami, USA

www.advancedmaterialscongress.org/america



European Advanced Materials Congress

28 - 31 August 2024
Stockholm, Sweden

www.advancedmaterialscongress.org/europe24



Baltic Conference Series

28 - 31 August 2024
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www.advancedmaterialscongress.org/world



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