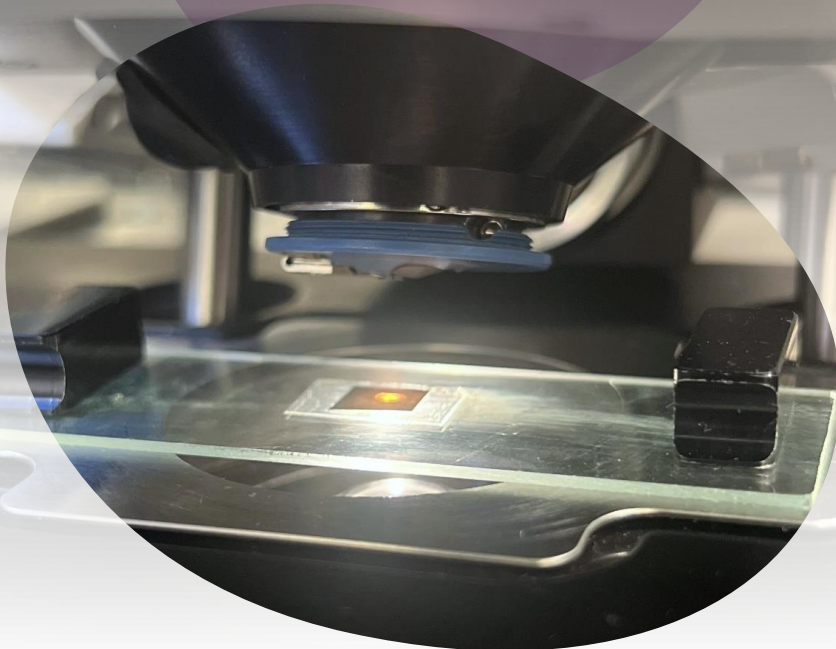


## Center for Advanced Materials

# NEWSLETTER

Issue 5

Atomic force microscope (AFM) with  
MFP-3D system located at CAM



### Inside this issue:

#### 01 **Achievements**

Awarded grants, and research highlights

#### 02 **People**

Promotions and new appointments

#### 03 **Center Activities**

Seminars, conferences, events, and visits.

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us on



October 2023

**Published by:**

CAM Newsletter & Press Committee

# Achievements

## Awarded Grants

PI	Title
Dr. Dong Suk Han (CAM) Dr. Mohammed Alsafran (ARS)	Extreme Climate Full-Cycle Green Infrastructure Development and Adaptation

**Korea Agency for  
Infrastructure Technology  
Advancement (KAIA)**

## Qatar University Graduate assistant (GA) grant

LPI	Title
Dr. Kishor	Developing chemosensing portable kit for rapid detection of carcinogenic organic pollutants in water

## Journal highlight

Qatar University (QU)'s 'Emergent Materials Journal' has announced its first-ever Impact Factor of 3.8, marking a remarkable achievement. Under the leadership of QU vice-president for Research and Graduate Studies Prof Mariam Al-Maadeed, 'Emergent Materials Journal' has expanded its reach and fostered an inclusive environment for groundbreaking research from around the world.



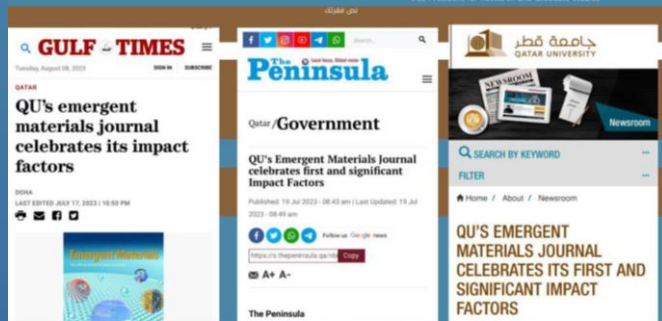
[Click here](#) to browse Emergent Materials

## OUR NEWS

**QU's emergent materials journal celebrates its impact factors**

We take immense pride in the journal's accomplishments and acknowledge the exceptional contributions of our national and international editorial team, the diligent reviewers, and the talented authors who have played a vital role in the success of 'Emergent Materials Journal'."

Prof. Mariam Al-Maadeed  
Vice President for Research and Graduate Studies



Qatar University (QU)'s 'Emergent Materials Journal' has announced its first-ever Impact Factor of 3.8, marking a remarkable achievement.

# Achievements

## Awards

### 15<sup>th</sup> UREP Competition

Dr. Shakoor and his team secured third place in the 15<sup>th</sup> Annual Undergraduate Research Experience Program (UREP) held on 25 September 2023.



Dr. Shakoor's research team's project titled "An innovative carbon neutral pathway for upcycling date palm waste into value-added coatings for sustainable corrosion protection of steel in oil and Gas industry" was shortlisted as a top 5 finalist in Postgraduate category across GCC in the GPCA Carbon Neutrality Cup Competition which has taken place on 5-7 September 2023 at The Ritz Carlton, Manama, Bahrain, as a part of the 5th GPCA Responsible Care Conference.



# Achievements

## Publications

### Selected CAM high impact publications 2023

Authors	Title	Journal	Impact factor
Maryam Al-Ejji, Mohammad K. Hassan, Khaled Youssef, Farah Elmakaty, Hanin Mehanna, Mostafa Sliem, Mohammad Irshidat	Novel surface-treatment for bottom ash from municipal solid waste incineration to reduce the heavy metals leachability for a sustainable environment	Journal of Environmental Management	8.7
Nan-Nan Liang, Dong Suk Han, Hyunwoong Park	Membraneless unbuffered seawater electrolysis for pure hydrogen production using PtRuTiO <sub>x</sub> anode and MnO <sub>x</sub> cathode pairs	Applied Catalysis B: Environmental	22.1
Tasneem Elmakki, Sifani Zavahir, Mona Gulied, Hazim Qiblawey, Bassim Hammadi, Majeda Khraisheh, Ho Kyong Shon, Hyunwoong Park, Dong Suk Han	Potential application of hybrid reverse electro dialysis (RED)-forward osmosis (FO) system to fertilizer-producing industrial plant for efficient water reuse	Desalination	9.9
Syed Zaidi et al	Qatar Desalination Research	Desalination	9.9
Syed Zaid et al	Progress in Reverse Osmosis Modeling	Desalination	9.9
Weiliang Bai, Laxmicharan Samineni, Progga Chirontoni, Igor Krupa, Peter Kasak, Anton Popelka, Navid B Saleh, Manish Kumar	Quantifying and reducing concentration polarization in reverse osmosis systems	Desalination	9.9
Mohamed Nassr, Igor Krupa, Mabrouk Ouederni, Senthil Kumar Krishnamoorthy, Anton Popelka	An Adhesion Improvement of Low-Density Polyethylene to Aluminum through Modification with Functionalized Polymers	Polymers	5.0
Haseena Onthath, Mostafa H Sliem, Mithra Geetha, Kishor Kumar Sadasivuni, Aboubakr M Abdullah, Bijandra Kumar	Template free synthesis of CuO nanocomposite for catalytic hydrogenation of CO <sub>2</sub>	Journal of Environmental Management	8.7
Godlaveeti Sreenivasa Kumar, Mizaj Shabil Sha, Swathi Yempally, John-John Cabibihan, Kishor Kumar Sadasivuni	A practical perspective for chromatic orthogonality for implementing in photolithography	Scientific Reports	4.6
A. Popelka, A. C. Padmanabhan, A. S. Elgendy, P. Sobolciak, I. Krupa, A. Bin Yousaf, M. Sebesta, J. Tkac, P. Kasak	Perfluorooctylsilane Grafted Ti <sub>3</sub> C <sub>2</sub> X-based hydrogel liquid marble for controlled movement, self-assembly, light-induced release, and water evaporation system.	Materials Today Communication.	3.8
V. Vrablova, N. Kosutova, A. Blsakova, A. Bertokova, P. Kasak, T. Bertok, J. Tkac	Glycans in extracellular vesicles toward clinical applications.	Biotechnology Advances	16
Khalid Bani-Melhem, Muhammad Rasool Al-Kilani	A comparison between iron and mild steel electrodes for the treatment of highly loaded grey water using an electrocoagulation technique	Arabian Journal of Chemistry	6
Khalid Bani-Melhem, Maria Elektorowicz, Muhammad Tawalbeh, Abeer Al Bsoul, Ahmed El Gendy, Hesam Kamyab, Mohammad Yusuf	Integrating of electrocoagulation process with submerged membrane bioreactor for wastewater treatment under low voltage gradients	Chemosphere	8.8
M.K.G. Abbas, S. Ramesh, S.F.H. Tasfy, K.Y. Sara Lee	Effect of microwave sintering on the properties of copper oxide doped alumina toughened zirconia (ATZ)	Journal of Materials Research and Technology	6.4
M.K.G. Abbas, S. Ramesh, S.F.H. Tasfy, K.Y. Sara Lee	A State-of-the-Art Review on Alumina Toughened Zirconia Ceramic Composites	Materials Today Communications	3.8
Fayyad, E. M., Jlassi, K., Sliem, M. H., Nabhan, F., & Abdullah	Design of highly anti-corrosive electroless plated Ni-P/modified halloysite nanotubes nanocomposite coating	Journal of Materials Research and Technology	6.3
Jlassi, K., Al Ejji, M., Ahmed, A. K., Mutahir, H., Sliem, M. H., Abdullah, A. M., & Krupa	A carbon dot-based clay nanocomposite for efficient heavy metal removal.	Nanoscale Advances	4.7

# Research highlights

## Director interview: Research, implementation vital to solving climate change issues

Professor Mohammad Irshidat, Director of CAM-Qatar University, emphasizes the importance of innovative research and proactive measures in addressing climate change challenges in the MENA region, such as extreme heat, water scarcity, and environmental risks due to human activities. The MENA region grapples with environmental consequences from political instability, oil and gas exploration, and food security concerns. To combat these challenges, countries like Qatar have committed to environmental strategies, with Qatar pledging a 25% GHG emission reduction by 2030. Despite these efforts, policy implementation remains a challenge in some nations. Prof. Irshidat highlights the vital role of translating research into practical solutions, such as sustainable practices and renewable energy, to ensure a resilient future and economic diversification.



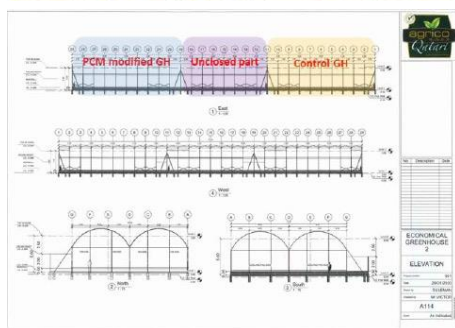
[Click here to browse the news](#)

## Greenhouses for Qatari Climate: Energy Saving Smart and Sustainable Phase Change Materials (Green3SPCM)



This project deals with designing and developing a novel compact, integrated thermal storage system to reduce energy consumption for heating and cooling of greenhouses. The thermal storage system is based on thermally enhanced phase change material (PCM) composites to control the indoor temperature of greenhouses and increase the energy efficiency of air conditioning systems in Qatar.

More specifically, the objective is the development of materials that effectively absorb and release thermal energy to ensure thermal indoor comfort and suitable conditions for plant growth, with minimal use of electrical power for cooling in summer and heating in the cold season. These materials, effectively installed within GH will be able to reduce variations in inside air temperature when outside temperature changes over the day. These components are applicable not only for GH but also for any constructions and buildings in general where electrical energy saving for air conditioning is demanded. The project involves CAM researchers (LPI: Prof. Igor Krupa) and industrial/agricultural companies (QAPCO and Agrico).

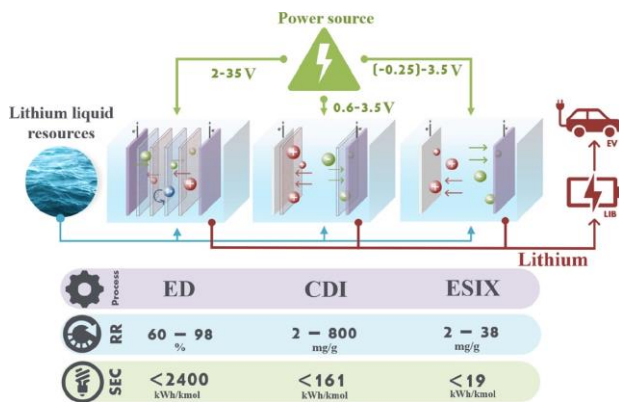


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# Research highlights

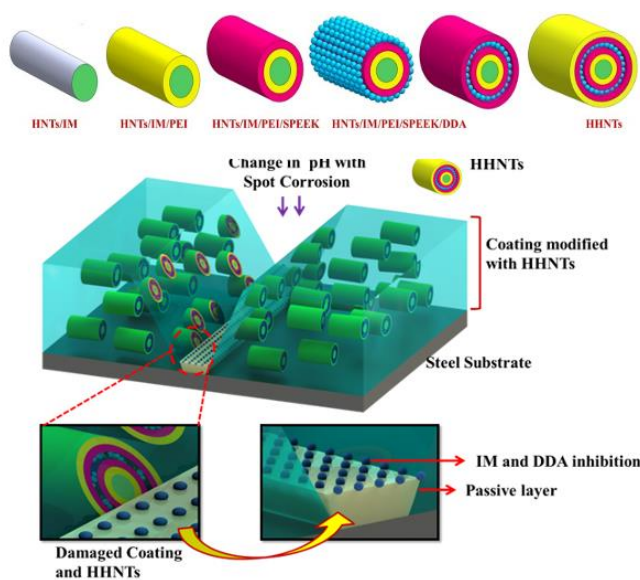
## Lithium recovery technology

Dr. Dong Suk Han's team has developed an electrochemical system to efficiently extract lithium from seawater, offering a greener, cost-effective alternative to traditional mining. This breakthrough is significant for Qatar, rich in seawater but lacking conventional lithium sources. The system, powered by concentrated solar energy, enriches lithium ions in seawater, minimizing energy consumption and carbon emissions. Unlike traditional methods requiring solar evaporation ponds and chemicals, this innovative approach utilizes a solar-concentrated thermoelectric device and a membrane distillation unit. The findings, published in reputable journals like *Desalination* and *Nanomaterials*, validate the system's effectiveness, marking a significant stride in sustainable lithium extraction from seawater.



## Revolutionary tech for oil and gas

Dr. Abdul Shakoor, Research Assistant Professor at CAM, is leading the active research on the design, synthesis, and characterization of polymeric smart self-healing composite coatings. This applied research is in progress through various funded projects, mainly including “Smart Corrosion Protection Strategies for Steel Materials in the Oil and Gas Industry”, “Smart Single Layer Polyolefin Coatings for Corrosion Protection of Steel Parts (S2Coat)” and “Bio-Based Smart Coatings for Corrosion Sensing and Corrosion Healing”. The novel formulations of developed coatings can be used extensively in seawater desalination systems, the oil and gas industry, and the automobile industry. This study confirmed the improved corrosion inhibition and self-healing properties of the polymeric composite coatings modified by various anti-corrosive pigments, in collaboration with their industrial collaborators, Qatar Shell Research and Technology Center (QSRTC) and Qatar Metal Coating Company (QCOAT).



Click here to browse the news

# Research highlights

## Innovative nanomaterial from date palm waste

Research team, led by Prof Syed Javaid Zaidi, Unesco Chair in Desalination and Water Technology, have pioneered a sustainable method for the preparation of innovative nanomaterial, graphene quantum dots (GQDs) from date palm leaf waste. This trailblazing approach, which began its journey in January 2022, uses water as a solvent, achieving a virtually chemical-free synthesis of GQDs and spotlighting a notable advancement in eco-friendly scientific methods. The inherent flexibility of GQDs can enable the creation of bendable screens, and their stability promises longer-lasting displays. All these properties combined can result in slim, efficient, and vibrant displays, although their commercial application is still under research. Currently, the team is harnessing the synthesized material as a nanomaterial to enhance the performance of desalination membranes, specifically improving their wettability and anti-fouling characteristics.

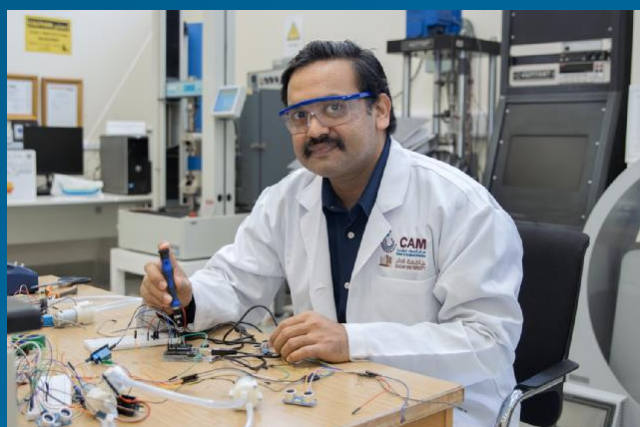


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## Sensors for Environmental and Human Protection

Dr. Kishor Kumar's group has innovated a range of sensors with applications across food safety, environment, and biomedicine. They've developed a non-invasive gas sensor for identifying metabolic diseases through breath analysis, utilizing volatile organic compounds as analytes. In food safety, they created an affordable paper-based chemosensor to assess fish freshness via trimethylamine detection. For environmental monitoring, they designed RFID-based sensors for enhanced corrosion detection in structures. Additionally, an IoT-based colorimetric sensor prototype for atmospheric formic acid, ethanol, and methanol detection, and biomedical sensors for medical diagnostics, including tactile sensors aiding surgeons, have been developed, showcasing their diverse contributions to sensor technology.



[Click here to browse the news](#)

# PEOPLE

## New Staff & Research Fellow



**Dr. Umar Amjad**  
Research Associate

Dr. Amjad is a Research Associate at the Center for Advanced Materials (CAM) of Qatar University. He received his M.Sc. degree in 2008 from Leipzig University, Germany and then worked on a European Union Project as a Junior Research Scientist. In 2014, he received a PhD from the department of Civil, Architectural Engineering and Mechanics (CAEM) with focus on Engineering Mechanics (Non-Destructive Testing using Ultrasound). After that Dr. Amjad worked as a consultant and research associate in the College of Engineering at the University of Arizona. He participated in several national and international conferences. In 2017, Dr. Amjad became a consultant for American Society of Mechanical Engineers (ASME) and assisted Editor-in-Chief of the research journal (ASME -JNDE). In 2018, he joined the College of Engineering at the University of Arizona as an adjunct faculty member and later he was appointed as a lead instructor for introductory engineering design course. In 2022, Dr. Amjad was promoted to Assistant Professor of Practice. In addition to his contribution to academics, Dr. Amjad worked closely with industry. He was interim chief technical officer and senior consultant for instrumentation and signal processing for Non-destructive testing (NDT). His current research focuses on creating smart solutions/devices for Non-destructive testing (NDT) and structural health monitoring (SHM). He has contributed in over 50 peer reviewed journal articles and conference proceedings, authored/co-authored 2 patents (pending). He also mentored several undergraduate and graduate students in engineering design and NDT/SHM projects.

**Dr. Muthumeenal Sundarapandian**  
Postdoctoral Researcher

Dr. Muthumeenal Sundarapandian is currently serving as a Postdoctoral Researcher at the Centre for Advanced Materials (CAM) at Qatar University, a position supported by the Qatar University Post-doc (QU-PDOC) grant. Prior to this, she amassed three years of postdoctoral experience at the Qatar Energy and Environment Research Institute (QEERI), HBKU, Qatar. Dr. Sundarapandian earned her Ph.D. in Polymer and Fuel Cell Technology from Alagappa University.

Following her doctorate, she contributed as a Junior Scientist at the Centre for Energy (CER), SPIC Science Foundation, under the aegis of Southern Petrochemical Industrial Corporation, India, for a span of six years. With a specialization in electrochemistry, Dr. Sundarapandian has garnered over a decade of research experience in the realm of polymer electrolyte membrane (PEM) based fuel cells, PEM synthesis/fabrication, electrolyzers, and flow batteries.

In her forthcoming venture, Dr. Sundarapandian will spearhead a green hydrogen production project for a duration of two years, under the mentorship of Dr. Dong Suk Han.

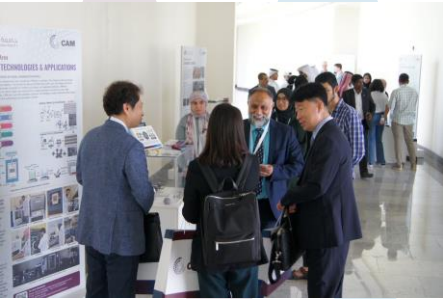




# CAM Activities

CAM Open Day

5<sup>th</sup> March 2023

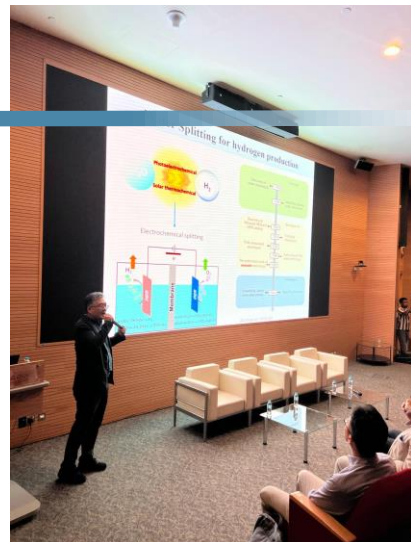


The Center for Advanced Materials (CAM) at Qatar University (QU) hosted an Open Day 2023 on May 22, with the objective of fostering academic collaborations and forging partnerships with industry, government, and academic enterprises; this initiative aligns with the organization's strategic goals. The event was particularly designed to promote dialogue and the exchange of ideas among experts from various disciplines, aiming to identify and explore opportunities for future interdisciplinary collaborations.



# CAM Activities

## Symposium on new energy highlights Qatari-Korean cooperation



A scientific symposium by Qatar University (QU), Korea University, and the Korean embassy in Doha highlighted Qatari-Korean cooperation in the new energy industry. Attended by experts, researchers, and students, the event discussed clean and renewable energy solutions, including advanced hydrogen technologies and hydrogen production from seawater. The symposium emphasized collaborative projects to advance renewable energy research, aligning with Qatar's National Vision 2030 for green energy. Dr. Mariam al-Maadeed from QU stressed the importance of shifting to renewable energy and fostering international partnerships. Korean ambassador to Qatar, Lee Joon-Ho, expressed optimism for strengthened Qatar-Korea green energy partnerships, underscored by recent agreements like the one between QatarEnergy and South Korean Samsung C&T Corp for developing two solar power plants.



# CAM Activities

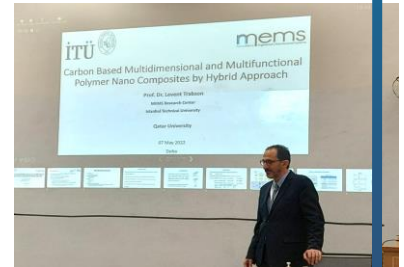
## Seminars

1

**07 May 2023**

**Title:** Carbon Nanofiller Based Multi-Dimensional and Multi-Functional Polymer-Nano-Composites

**Speaker:** Prof. Levent Trabzon, Istanbul Technical University, Turkey



2

**11 May 2023**

**Title:** Molecular Engineering of Porous Polymers for Energy-Efficient Separation and Unique Performance & General CPG Overview

**Speaker-1:** Dr. Theis Solling, KFUPM, Saudi Arabia

**Speaker-2:** Dr. Mahmoud Abdulhamid, KFUPM, Saudi Arabia



3

**16 May 2023**

**Title:** How Does the UK Water Sector Plan for its Future?

**Speaker-1:** Ms. Ghalia Albarazi, Senior Advisor, Water lead, GHD, UK



4

**18 May 2023**

**Title:** The Science of Carbon Dot Luminophores

**Speaker-1:** Dr. Andrey L. Rogach, City University of Hong Kong



5

**24 May 2023**

**Title:** Management of Oil\_and\_Gas Wastewater and Sludge towards the Implementation of Circular Economy  
**Speaker-1:** Mohamed Gamal El-Din, University of Alberta, Canada

**Title:** Biochar for Land Reclamation and Remediation: Case studies from Canada

**Speaker-2:** Dr. Asfaw Bekele, ExxonMobil, Canada



6

**29 May 2023**

**Title:** Hydrogel Membrane for Wastewater Treatment

**Speaker:** Dr. Ali Altaee, University of Technology Sydney, Australia



7

**07 June 2023**

**Title:** Mastering the art of writing a review paper: A step-by-step guide for undergraduate and graduate students

**Speaker-1:** Dr. Mohamed Kamaleldin Abbas



8

**30 Aug 2023**

**Title:** A Demand Side Management Approach for Hybrid Renewable Energy-Integrated Battery and Electrolyser System

**Speaker:** Mr. Ebrima L. Darboe, Gambia University



9

**03 Sept 2023**

**Title:** Empowering Sustainability: Membrane Technology for Gas and Water Purification"

**Speaker:** Dr. Faheem Hassan Akhtar, Head of Chemical Engineering, LUMS, Pakistan



# CAM Activities

## Conference participation

CAM is pleased to announce that our members recently participated in the successful "3rd Recycling Towards Sustainability Conference & Exhibition-Doha 2023" organized by the Ministry of Municipality in Qatar. It was a fantastic event focused on promoting sustainable practices.

Prof. Mohammad Irshidat, CAM Director, delivered a captivating presentation titled "Towards Sustainable and Green Building Materials - Development of Sustainable Binder with Recycled MSWI Ashes." The audience was engaged and inspired by his research on sustainable binder development.

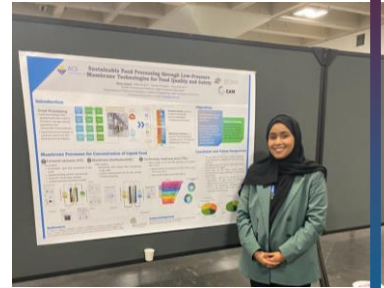


Additionally, Prof. Igor, a research professor at CAM, shared valuable insights on "Recycling Possibilities of Polyethylene Waste Originated from Packaging." His presentation shed light on innovative recycling methods for polyethylene waste. We are proud to have contributed to the conference and grateful for the opportunity to showcase our research. Thank you to the Ministry of Municipality for organizing this impactful event. Stay tuned for more updates on CAM's ongoing research and future collaborations!

## Participation in the American Chemical Society (ACS) Spring 2023 conference



Dr. Hassan, Res. Associate Professor at CAM, and Miss Mona Gulied participated in the ACS Spring 2023 conference with topics entitled: "Silicone Rubber based Nanocomposite coatings as installing materials for high voltage applications in Qatar", and "Sustainable food processing through low-pressure membrane technologies for food quality and safety", respectively.



13th -17th August in San Francisco- USA

## Visiting Skydrops Company

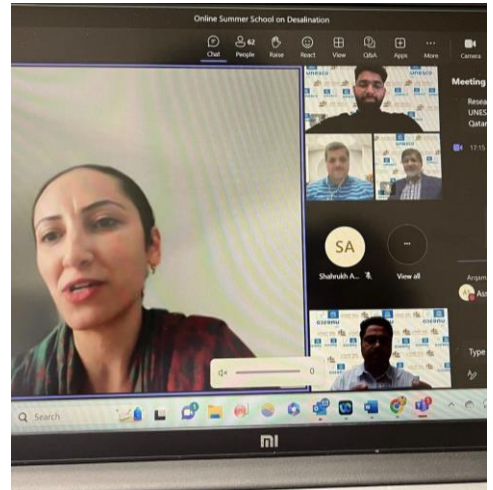
A research team from Center for Advanced Materials (CAM) recently visited Skydrops Company to discuss potential collaborations on water technology research projects. This visit is a great example of how academia and industry can work together to advance knowledge and technology.



# CAM Activities

## Online Training

The UNESCO Chair at Qatar University (QU) recently organized a two-day online summer school on "Desalination Technologies" with Aligarh Muslim University (AMU), India. Focusing on global water challenges, the event aligned with the United Nations Sustainable Development Goal 6. Over 600 registered, with 100 students participating. Donia Abdelwahed from Unesco Doha expressed support for the initiative. The program included lectures, virtual lab tours, and training on desalination techniques. Prof Syed Javaid Zaidi, the Unesco chair, emphasized the event's educational impact. Guest speakers shared insights on desalination fundamentals, safety measures, and emerging technologies like pressure-restricted osmosis.



## Meeting with Korea Water Cluster



The meeting with the Korea Water Cluster team, led by Prof. Mariam Al-Maadeed, the Vice President of the Research & Graduate Studies Office at Qatar University, was truly delightful.

Our discussions primarily focused on the creation of potential international research grants for Water Technology Development, with a strong emphasis on fostering collaboration between both parties. We also explored various avenues for co-training programs, workshops, conferences, student exchanges, and more.

The meeting was attended by several key individuals, including CAM Director (Prof. Mohammad Irshidat), CAM Project Manager (Dr. Noora Al-Qahtani), Water Technology Unit's faculty (Dr. Dong Suk Han), Korean Water Cluster (Manager, Dr. Jung-Eun Gu), Doosan Enerbility (Principal Research Engineer, Mr. Kyunghyun Byun), Aquatech Korea Co.

It is worth noting that the Korea Water Cluster operates as an organization under the Ministry of Environment in Korea, further underscoring its significance in the field.

**Korea Water Cluster Agenda**

- Training exchange for engineer Using KWC demonstration facilities and analysis equipments
- Technology exchange Symposium between the companies of KWC and QU
- Seminar on advanced analytical technology
- Joint research for innovative technology development and demonstration between water companies of KWC and Qatar university
- Utilizing the demonstration facilities and analysis equipments of the KWC and QU

**01 Overview Aerial View**

**Cluster of water companies**

- Area: 480,000m<sup>2</sup>
- Target: 50 resident companies
- Sales managed by Daegu Metropolitan City
- Currently, 36 facilities are sold(64%)
- 22 facilities in operation

**Korea Water Cluster**

- Area: 145,000m<sup>2</sup>
- Operated by K-eco
- 141 facilities to lease
- Currently, 107 (out of 133) facilities are leased (94%)

# CAM Activities

## Filtration unit installed at CAM

### Pilot plant for water production

WTU have commissioned a water pilot plant in a small-scale system which designed for supervisory mineral additives technology for healthy water purposes.

It serves as an intermediate step between laboratory-scale experiments and full-scale commercial or industrial systems.

The primary purpose of the pilot plant is to assess the feasibility and efficiency of different types of healthy water.

The customized pilot plant was utilized to gather data on key performance metrics, such as water quality improvements, membrane fouling rates, and energy consumption.

### Biological and chemical inspection from an authorized accredited laboratory from the Ministry of Public Health

Gulf laboratory company has been tested the resultant water quality with explore more than a 12 chemical and biological analysis on the different types of healthy water.



## Partnership Contract

We're excited to announce a partnership between the Center for Advanced Materials (CAM) at Qatar University (QU) and The Institute of Mechanical Engineers, UK (IMEchE), advancing Non-Destructive Testing (NDT) in Qatar. This collaboration will offer comprehensive NDT training and certification in line with the Personnel Certification in NDT (PCN) plan approved by the British Institute of NDT (BiNDT) and accredited by Qatari Oil and gas companies. IMechE, with over 30 years of experience, will enhance the training from Level 1 to Level 3. CAM is establishing a dedicated NDT training center in Qatar, equipped with well-prepared laboratories, to cater to local industry needs in various NDT schemes.