

THE 4<sup>th</sup> REGIONAL CONFERENCE  
ON  
MATERIALS SCIENCE AND MANUFACTURING TECHNOLOGY

25-27 Nov. 2025, Sofitel Hotel, Cairo - Egypt

Organized by:

Central Metallurgical Research & Development Inst. (CMRDI-Egypt)

The Egyptian Materials Research Society (Eg-MRS-Egypt)

Scientific Program



**Tuesday, 25 Nov. 2025**

**8:30 - 9:00 REGISTRATION**

**Welcome Speech**

**9:00 - 9:30**    **Prof. Ibrahim Gahyad**  
                  **President of CMRDI**  
**Prof. Mohamed Ayman Ashour**  
                  **Minister of Higher Education and Scientific Research**  
**Prof. Abdelmajid Ben Amara**  
                  **Head of the Federation of Arab Sci. Res. Councils**  
**Dr. Sayed Meshaal**  
                  **Former Minister of Military Production**  
**Prof. Ibrahim El-Sherbiny**  
                  **President of Zewail City of Science and Technology**  
**Prof. Mohamed Al-Saadawi**  
                  **President of the Housing and Building National**  
                  **Research Center**

**Session- 1**

**Chairperson:**    **B. Zaghlol (Egypt) & A. Tiwari (Sweden)**

**9:30 - 10:15**    Innovative smart nanomaterials for disease treatment and diagnosis  
                  **I.M. Elsherbiny (Egypt), Plenary**

**10:15 - 11:00**    Tailoring mechanical properties through electropolishing treatment on  
                  additively manufactured lightweight lattice metamaterials  
                  **R. Das (Australia), Plenary**

**11:00 - 11:30**    **Coffee Break**

**Session- 2**

**Chairperson:**    **M. Rashad (Egypt) & L. Fillippov (France)**

**11:30 - 12:10**    Single-atom catalysts for the efficient and selective synthesis of fuel  
                  additives.  
                  **S. El-Shall (USA), Plenary**

**12:10 - 12:50**    Advanced membrane operations in CO<sub>2</sub> capture  
                  **G. Barbieri (Italy), Plenary**

**12:50 - 13:15**    Fine-tuned hetero-junction materials for photo-assisted electrocatalysis  
                  applications  
                  **A. Galal (Egypt), Keynote**

**13:15 - 13:45**    Advanced manufacturing of composite materials from research to reality  
                  **H. El-Dessouky (Egypt), Keynote**

**13:45 - 14:00**    Incorporating CsSCN in triple-cation mixed halide perovskites  
                  **M. Elsenety (Greece)**

- 14:00 - 14:15** Innovative synthesis of conducting polymer/MXene nanocomposite for superior energy-storage materials  
**A. Salem (Egypt)**
- 14:15 - 14:30** Electrochemically activated tetrametallic Ni-Co-Fe-Mn sulphide electrocatalysts for highly durable alkaline water electrolysis  
**M.M. Hasan (Egypt)**

**14:30 – 15:30**

## **Group Photo & Lunch**

### **Session-3**

**Chairperson:** **A. Nofal (Egypt) & M. Javidani (Canada)**

- 15:30 - 16:10** An effective nitrogen removal technology in IF steel production with EAF-RH route based on bubble metallurgical technology  
**J. Liu (China), Plenary**
- 16:10 - 16:35** Control of metallic yield in the electric arc furnace  
**A. Conejo (China), Keynote**
- 16:35 - 17:00** Machine-learning-driven synergistic optimization of multi-objective mechanical properties of steel materials  
**Y. He (China), Keynote**
- 17:00 - 17:15** Simulation by multi-stage uniaxial hot compression and subsequent double-fold cooling for early bainite and late martensite generation in Si-Cr-Mo steel  
**M. El-Meligy (Egypt)**
- 17:15 - 17:30** Modeling the high temperature deformation of a novel Ti-Nb-Ta-Mo alloy for biomedical applications  
**M.A. Gepreel (Egypt)**
- 17:30 - 17:45** Laser surface treatment of different cast irons: microstructural evolution and mechanical performance  
**S. Al-Sayed (Egypt)**
- 17:45 - 18:00** Microstructure analysis on neutralization and dissolution of iron intermetallics in Al-(7-11) % Si alloys  
**M. A. Moustafa (Egypt)**

**Wednesday, 26 Nov. 2025**

### **Session-1**

**Chairperson:** **K. Abdelghani & O. Adiguzel (Turkey)**

- 9:00 - 9:40** High-strength, high-conductivity aluminum alloys via strategic alloying and advanced thermomechanical treatments  
**M. Javidani (Canada), Plenary**
- 9:40 - 10:10** High-power fiber lasers for material processing  
**S.W. Harun (Malaysia), Keynote**
- 10:10 - 10:40** Residual stresses development, microstructure evolution, and predictive FEM modelling in zirconium and titanium alloys

**G. Kumar (UAE), *Keynote***

**10:40 - 11:00** From atoms to automation: the role of AI in materials and manufacturing  
**M. Saleh (Egypt)**

**11:00 - 11:30** **Coffee Break**

## Session- 2

**Chairperson:** **I. Ahmed (Egypt), M. Farahat (Egypt)**

**11:30 - 12:10** Processing routes for the recovery of lithium and critical metals from pegmatite and rare-metal granite deposits  
**L. Filippov (France), *Plenary***

**12:10 - 12:40** Mineral beneficiation intrigues for future mining and processing with generation Z engineers in Sub-Saharan Africa  
**A. Mulaba (South Africa), *Keynote***

**12:40 - 13:10** Mechanistic insights into size distribution reversal during attrition  
**A.A. El-Midany (Egypt), *Keynote***

**13:10 - 13:25** Sustainable recycling route for pyrite tailings and gypsum waste toward iron, lime, and sulfur  
**H. Ahmed (Sweden)**

**13:25 - 13:40** Application of artificial intelligence and big data analysis for better utilization of iron ores in Egypt  
**M. Hassan (Egypt)**

**13:40 - 13:55** Developing solar-interfacial evaporation membrane from Egyptian kaolin for wastewater treatment  
**H. Abdelghafar (Egypt)**

**13:55 - 14:10** Use of natural rock material to inhibit the corrosion of titanium alloy: an electrochemical and surface study  
**A. Fekry (France)**

**14:10 - 14:30** Unveiling the structural, optical, mechanical, dielectric, and Ferroelectric features of lead–zirconate titanate and multi-walled carbon nanotubes (PZT- MWCNTs) for ultrasonic transducers  
**G.M. Elhefnawy (Egypt)**

**14:30 - 15:30** **Lunch**

## Session- 3

**Chairperson:** **E. Ewais (Egypt) & J. Liu (China)**

**15:30 - 16:00** Comparative thermal analysis of dimpled and plain paraffin wax capsules in packed-bed energy storage systems  
**R. Deepakkumar (India), *Keynote***

**16:00 - 16:15** Advanced polymer composites: from synthesis to application  
**M. Abdelaziz (Egypt)**

**16:15 - 16:30** Development of a lightweight automotive bumper beam produced from polymer composites reinforced with carbon and glass fibers  
**F. Fairouz (Egypt)**

**16:30 - 16:45** Electrolyte nature can boost electrode performance in aqueous

- Zn//WO<sub>3</sub> mixed-ion battery  
**F. Heakal (Egypt)**
- 16:45 - 17:00** Revitalization of lanthanum strontium manganite using titanium ions substitution and studying their impact on the electrical and magnetic features  
**A. Omar (Egypt)**

### Poster Session 17:00 – 18:00

**Thursday, 27 Nov. 2025**

#### Session- 1A

- Chairperson:** **A. El-Batahgy (Egypt) & R. Das (Australia)**
- 9:00 - 9:40** Recent developments in ADI metallurgy and applications at CMRDI  
**A. Nofal (Egypt), Plenary**
- 9:40 - 10:10** Building the future of metal manufacturing: hybrid solutions for repair and the manufacturing of medium-to-large-scale metal components  
**H. Salem (Egypt), Keynote.**
- 10:10 - 10:25** Gleeble simulation in welding research: a comprehensive review of applications, techniques, and advancements  
**K. Hafez (Egypt)**
- 10:25 - 10:40** Successful repair of a severely damaged process cooler (303E001) in an ammonia Plant  
**M. Tayle (Egypt)**
- 10:40 - 11:00** Effect of Nano Dispersions of Al<sub>2</sub>O<sub>3</sub> on the Mechanical and Physical Properties of Al-Fe-Co-Ni-Ti high entropy alloy  
**A. Hamada (Egypt)**
- 11:00 - 11:30** **Coffee Break**

#### Session- 1B

- Chairperson:** **M. Rashad (Egypt) & G. Barbieri (Italy)**
- 9:00 - 9:40** Structure regulation of hard carbon crystallites for advanced sodium storage  
**J.G. Wang (China), Plenary**
- 9:40 - 10:10** Electrochemistry for a sustainable future: advancing clean energy conversion and storage  
**E. Elsayy (Egypt), Keynote**
- 10:10 - 10:40** Molecular design and interface regulation of anode materials for sodium batteries  
**F. Xu (China), Keynote**
- 10:40 - 11:00** Transforming HMF into FDCA: a cobalt-nitrogen carbon catalyst for dual thermal and electrochemical processes  
**S. El-Hout (Egypt)**
- 11:00 - 11:30** **Coffee Break**

## Session- 2A

**Chairperson:** T. Mattar (Egypt) & S. Harun (Malaysia)

- 11:30 - 12:10** Industry readiness index for industrial organizations' stability  
**Y. Mourad**, *Plenary*
- 12:10 - 12:40** Advancing the constitutive modeling of hot deformation: from classical approaches to AI-enabled predictions.  
**A. Shokry (Egypt)**, *Keynote*.
- 12:40 - 13:10** Memory characteristics and deformation temperature-dependent reversibility in shape memory alloys  
**O. Adiguzel (Turkey)**, *keynote*
- 13:10 - 13:40** Greening steel: what? why? and how? sharing sustainability initiatives  
**I. El-Mahallawi (Egypt)**, *Keynote*
- 13:40 - 13:55** Automatic welding vs manual welding in pipeline projects  
**K. Khedr (Egypt)**
- 13:55 - 14:10** Inclusion-induced fatigue failure mechanisms in galvanized class 10.9 bolts used in axial-flow power plant fans: a fractography-microstructure correlation study  
**H. Abdel-Aleem (Egypt)**
- 14:10 - 14:30** Dissimilar welding difficulties  
**A. Y. Mohamed (Egypt)**
- 14:30 - 15:30** **Lunch**

## Session- 2B

**Chairperson:** O. Fouad (Egypt), J.G. Wang (China)

- 11:30 - 12:10** Zero materials & sustainable manufacturing: translating advanced materials into a climate-positive industry  
**A. Tiwari (Sweden)**, *Plenary*
- 12:10 - 12:40** CO<sub>2</sub> conversion to green hydrocarbon fuels  
**A. Abdelmoneim (Egypt)**, *Keynote*
- 12:40 - 13:10** Enhancing phosphoric acid separation from phosphogypsum crystals using physical and chemical techniques  
**E.A. Abdelal (Egypt)**, *Keynote*
- 13:10 - 13:25** Fabrication and dielectric characterization of alumina ceramic composites for a high-voltage transmission line insulator  
**N. El-Mehalawy (Egypt)**
- 13:25 - 13:40** Approaching high-performance lithium storage materials via physical and chemical strategies  
**M. Sanad (Egypt)**
- 13:40 - 13:55** Synergistic capacitance and long-term stability of MOF/carbon hybrid electrodes for supercapacitors  
**A. Heiba (Egypt)**
- 13:55 - 14:10** Synthesis, characterization, and electrochemical performance of LiMnMo(PO<sub>4</sub>)<sub>3</sub> cathode compound for lithium batteries  
**A. Shenouda (Egypt)**

**14:10 - 14:30** Metal-doped calcium aluminate nanocrystalline as transparent Conductive oxide for optoelectronics Applications  
**D.A. Rayan (Egypt)**

**14:30 - 15:30** **Lunch**

### Session- 3A

**Chairperson:** **I. El-Mahallawi (Egypt), T. El-Bitar (Egypt)**

**15:30 - 15:45** The correlation between layer height and model design in 3D inkjet printing  
**A. El-Kasser (Egypt)**

**15:45 - 16:00** Biomaterials and their applications  
**K. Ibrahim (Egypt)**

**16:00 - 16:15** On the biocompatibility of surface-treated additively manufactured Ti-6Al-4V alloys for implant applications  
**T. Aly Elmeligy (Egypt)**

**16:15 - 16:30** Benchmarking and experimental evaluation of laser powder bed fusion (LPBF) components for biomedical  
**Y. Taibany (Egypt)**

**16:30 - 16:45** Laser Welding of Magnesium Alloys to Zn-coated Steel  
**M. Wahba (Egypt)**

**16:45 - 17:00** Experimental calibration and numerical simulation of dwell-time influence in WAAM thermal cycles  
**M.A. El-Sayed (Egypt)**

**17:00 - 17:15** A physics-informed learning framework for topology optimization in metal AM  
**I.H. Abdelgalil (Egypt)**

**17:15 - 17:30** Rapid thermal simulation for industrial parts fabricated by wire arc additive manufacturing  
**A. Elmansy (Egypt)**

**17:30 - 17:45** Plane-strain compression behaviour and failure analysis of FDM-fabricated PLA gyroid and neovius TPMS lattices  
**M. Asfoury (Egypt)**

**17:45 - 18:00** Advancing eco-friendly practices through thermomechanical processing techniques of high-performance lightweight alloys  
**H. Refaiy (Egypt)**

### Session- 3B

**Chairperson:** **Z. Abdelhamid (Egypt), Z. El-Baradie (Egypt)**

**15:30 - 15:45** Engineered Chitosan/Waste Derived Cu<sub>2</sub>O Composite Films for Simultaneous Bacterial Inhibition and Wastewater Purification  
**F. Abdel Mouez (Egypt)**

**15:45 - 16:00** Engineering La<sub>0.67</sub>Sr<sub>0.33</sub>MnO<sub>3</sub> from nanoparticles to thin films: thickness-dependent optical properties for solar cell applications  
**M. Salim (Egypt)**

**16:00 - 16:15** Corrosion rate prediction for underground gas pipelines using Levenberg-Marquardt artificial neural network (ANN)

- A. Ahmaid (Libya)**
- 16:15 - 16:30** FEA and experimental verification for strain hardening behavior of ultra-low carbon and IF steels by uniaxial cold upsetting  
**A. Mohammed (Egypt)**
- 16:30 - 16:45** Performance enhancement of abrasion-resistant iron alloys.  
**N. El-Banna (Egypt)**
- 16:45 - 17:00** Tribological behavior of SiMo ductile iron under different operating conditions  
**D. Abdelrahim (Egypt)**
- 17:00 - 17:15** Challenges in restoring thinned bulged zone at secondary reformer  
**M. Sayed (Egypt)**
- 17:15 - 17:30** Treatment and consolidation of mummies and human bone remains via natural chitosan for improving antimicrobial and mechanical strength properties  
**E.M. Mahmoud (Egypt)**

## Posters

- H. Khattab.** Multifunctional  $\text{dy}^{3+}$ -doped  $\text{Ba}_6\text{Y}_2\text{W}_3\text{O}_{18}$  nanophosphors for hydrogen generation, anti-counterfeiting, and forensic applications.
- T. El-Barbary.** Leaching of magnesium from refractory bricks by sulphuric acid.
- M. Omran.** Sustainable recycling of spent lithium-ion batteries (LiBs) by applying innovative technology.
- R. Amin.** Statistical modelling and optimization study for removing coloring materials from fine albite particles.
- O. Fouad.** Nanoscience and nanotechnology: from lab to app.
- A. Sery.** A promising inorganic hole transport layer for high-performance inverted perovskite solar cells.
- M. Eissa.** The effect of alloying and ultrasonic vibration on the modification of Mg-based alloys for implant applications.
- S. Abolkassem.** Effect of rare earth oxide-coated Cu on the mechanical and physical properties of Cu-TiN and Cu-CNT prepared by powder metallurgy techniques/
- R. Salem.** Understanding the structural, morphology, optical, and magnetic properties of strontium tungstate nanoparticles synthesized using a facile co-precipitation strategy.
- D. Mohamed.** The role of innovation, research, and development in the development of industrial sectors
- H. Halfa.** Phase transformation behaviour of niobium and nitrogen-containing AISI M2 high-speed tool steel: a comparative study.
- M. El-Meligy.** Artificial Intelligence (AI) for serving innovative mechanical deformation processes: A review article
- S. Helal.** Sustainable porous carbon materials for energy storage applications.
- R. Abdelhameed.** Porous membranes for air pollutant remediation: synthesis, characterization, and role in mitigating environmental impacts.
- D. Abdo.** Potential for eco-friendly recovery of zinc and manganese metals from spent dry batteries using carboxylic acids.
- N. Khaled.** Improving stripping/plating efficiency in magnesium-ion batteries with novel composite electrolytes.
- A. Alkoussy.** Topography of the aluminum-clad track on a steel substrate using



WAAM.

18. **T. Khedr.** Efficient design of novel mesoporous Bi<sub>2</sub>WO<sub>6</sub>-based S-scheme heterojunction photocatalysts for visible light-induced H<sub>2</sub> generation.
19. **E. Fawzy.** New molybdate / vanadate-based anode materials for high-performance Li<sup>+</sup> ion batteries.
20. **A. Elmaddah.** From powder to power: design and development of carbides and nitrides composites for high-performance solar energy systems
21. **F. Nouh.** Impact of alumina-graphene nano plates composite powder on the microstructure, corrosion behaviour & mechanical properties of aluminium composite by Vortex technique.
22. **A. Elshazly.** Spent lithium-ion batteries as a resource hub for copper and nickel-manganese-cobalt based materials in the clean energy era.
23. **A. Elseman.** Sustainable recycling of spent lead-acid batteries into perovskite thin films via Inkjet printing for solar energy.
24. **R. Geioushy.** Highly sensitive paper-based ZnS nanoparticle sensor for colorimetric detection of Cu<sup>2+</sup> and Hg<sup>2+</sup> Ions in water.
25. **D. Mahmoud.** Producing deep-drawn cups from low-carbon hot-rolled and forged circular blanks.
26. **A. Seada.** Seismic-resistant steel production from scrap with up to 0.6% copper.
27. **S. Tarek.** Fabrication and evaluation of ternary nanofiller-enhanced PVDF membranes for water purification.
28. **M. Essam.** Processing and microstructural-mechanical optimization of Ti-5Al-4W-2Fe alloy via powder metallurgy for structural applications.
29. **N. El-Bagoury.** Nickel-based superalloys casting, applications, and properties.
30. **I. Abdelwahid.** Feasibility study: determination of xanthates and their degradation products in mining process water.
31. **O. Wael.** Assessment of cranial implant reconstruction algorithms under augmented data conditions toward topology-optimized and 3D-printed tailored implants.
32. **A. Samir.** A comprehensive study on the shape prediction of non-tubular inflatable structures manufactured from PVC-coated fabrics.
33. **E. Elsayed.** Electrochemical evaluation of the highly efficient MgFe<sub>2</sub>O<sub>4</sub>/Mg-MOF electrode usage as the electrocatalyst anode in direct methanol fuel cells (DMFCs).
34. **K. Hamdy.** Sustainable seed extract as a green tool for historical papyrus paper conservation.
35. **A. Khalifa.** Effect of basicity optimization on the properties of indurated pellets produced from a sustainable blend of Brazilian concentrate and Egyptian El-Dekhila Fines
36. **H. Hussein.** Development of ceramic hard coating by different methods for industrial applications
37. **Ph. Mbinda.** Integrating ocean water in wastewater reuse systems: opportunities for climate-resilient water management in Africa
38. **H. Aly.** Characterization and corrosion performance of a novel Cu<sub>40</sub>Mn<sub>25</sub>Al<sub>20</sub>Fe<sub>5</sub>Co<sub>5</sub>Ni<sub>5</sub> high entropy alloy in HNO<sub>3</sub> solution
39. **M. Youssef.** Nb-micro alloyed high-strength steel for multilayer composites: design-processing performance
40. **H.H. Ali.** Phase transformation behavior of Um-Bogma manganese ore: A comparative study of thermal and microwave treatment
41. **E.M. Sobhy.** Analysis of the impact of implementing closed-loop automated control systems on sustainability and achieving competitive excellence in small and medium enterprises in light of reverse engineering

