
# CALL FOR ABSTRACTS

The International Conference on Metallurgical Coatings and Thin Films (ICMCTF) is recognized as the premier international conference on thin film deposition, characterization, and advanced surface engineering. It provides a forum and networking venue for scientists, engineers, and technologists from academia, government laboratories, and the private sector. Attendees from around the world gather to present their findings, exchange ideas, share insights, make new friends, renew old acquaintances, and establish collaborations. ICMCTF typically attracts over 500 attendees, featuring approximately 35 oral technical sessions and a well-attended Thursday evening poster session.

ICMCTF 2026 will have seven technical symposia covering synthesis processes, materials (four symposia), advanced characterization, modeling, digitalization, and industrial applications, and three topical sessions featuring materials, methods, and applications that focus our attention on 'Surface Engineering: Shaping Future Materials', which is the overarching theme of ICMCTF 2026. The conference will open on Monday morning with Professor Pulickel M. Ajayan from Rice University, Texas, US, delivering a plenary lecture entitled "Nano-Engineered Materials: Heterostructures and Composites." Other notable highlights of the meeting will include our Keynote Lectures, which highlight the importance of surface engineering for industrial motion components and biomedical applications.

In addition to the technical program, the conference features a two-day industrial exhibition showcasing the latest equipment, materials, and services used for the deposition, monitoring, and characterization of coatings and thin films. The exhibition, scheduled for Tuesday and Wednesday, April 21-22, will be open to the public. Additionally, a Career Center will be available, where organizations can post job openings and conduct interviews with candidates for positions throughout the week. An educational program of Short Courses (ICMCTF Academy) will be offered throughout the week.

Each year, the R.F. Bunshah and Bill Sproul Award Laureates, along with three outstanding Graduate Student Award winners, are celebrated during a special convocation ceremony held on Wednesday, April 22, in the late afternoon, followed by a festive reception in the evening. Additionally, we hope to see many of the major leaders from previous years' conferences.

ICMCTF will again publish excellent scientific and technical work, after peer review, in the Elsevier journals Surface and Coatings Technology (IF = 6.1) and Vacuum (IF = 3.9*)*. We encourage authors to submit manuscripts by July 2026. The papers will be open access for 12 months after publication.

The Town and Country Resort Hotel and Convention Center, located in sunny San Diego, California, will serve as the official conference venue, providing a relaxing atmosphere for discussions and networking among attendees.

We welcome your participation and look forward to receiving your abstract by the submission deadline, October 27, 2025. Submit your abstract HERE!

Sandra E. Rodil
2026 Program Chair

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Symposium Chair: Francisco Javier Pérez-Trujillo, Universidad Complutense de Madrid, Spain, fjperez@ucm.es

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## SYMPOSIUM MC (Materials C): TRIBOLOGY AND MECHANICS OF COATINGS AND SURFACES
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### *MC1: Friction, Wear, Lubrication Effects, and Modeling*

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### *MC3: Tribology of Coatings and Surfaces for Industrial Applications*

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## SYMPOSIUM MD (Materials D): SURFACE ENGINEERING OF BIOMATERIALS, DEVICES, AND REGENERATIVE MATERIALS: HEALTH, FOOD, AND AGRICULTURE APPLICATIONS

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Symposium Chair: Mathew T. Mathew, University of Illinois College of Medicine at Rockford and Rush University Medical Center, USA, mtmathew@uic.edu

### *MD1: Coatings and Surfaces for Medical Devices: Mechanical, Corrosion, Tribocorrosion and Surface Processing*

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### *MD2: Coatings and Sensors for Health, Food and Agriculture: Antibacterial, Bioactive, and Flexible Interfaces*

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## SYMPOSIUM CM: ADVANCED CHARACTERIZATION, MODELLING AND DATA SCIENCE FOR COATINGS AND THIN FILMS

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Symposium Chair: Sebastian Siol, Empa, Swiss Federal Laboratories for Materials Science and Technology, Switzerland, sebastian.siol@empa.ch

### *CM1: Spatially-resolved and In-Situ Characterization of Thin Films, Coating and Engineered Surfaces*

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### *CM2: Advanced Mechanical-Physical Testing of Surfaces, Thin Films, Coatings, and Small Volumes*

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### *CM3: Data-Driven Thin Film Design: High-Throughput Experimentation, Simulation, and Machine Learning*

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## SYMPOSIUM IA: SURFACE ENGINEERING - APPLIED RESEARCH AND INDUSTRIAL APPLICATIONS

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### *IA1: Advances in Application Driven Research and Hybrid Systems, Processes, and Coatings*

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### *IA2: Surface Modification of Components in Automotive, Aerospace and Manufacturing Applications*

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### *IA3: Innovative Surface Engineering for Advanced Cutting and Forming Tool Applications*

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**SYMPOSIUM TS: TOPICAL SYMPOSIUM ON SUSTAINABLE SURFACE ENGINEERING**

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Symposium Chair: Martin Welters, KCS Europe, Germany, welters@kcs-europe.com

***TS1: Coatings for Batteries and Hydrogen Applications***

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***TS2: Coatings and Surfaces for Renewable Energy Technology***

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***TS3: Circular Strategies for Surface Engineering***

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# TOPICS & SESSIONS

## *Symposium PP: Plasma and Vapor Deposition Processes*

Symposium PP covers cutting-edge developments in plasma and vapor deposition technologies for advanced thin film synthesis and surface engineering. Topics include innovations in PVD, CVD, and plasma-assisted methods, along with in-situ diagnostics, plasma-surface interactions, and simulation-driven process control. The symposium also highlights emerging approaches such as data-enabled process optimization and greybox modeling, which combine physical and machine learning models to improve predictions of coating performance and wear behavior. Applications span protective coatings, electronics, energy, and biomedical devices, bridging fundamental research with industrial impact.

### PP1: PVD Coating Technologies

This session solicits contributions related to the development of new PVD methods and the advancement of industrially applied technologies. Sputtering, cathodic arc, anodic arc, laser, and electron beam-based methods and their combinations are considered in particular. The session welcomes contributions incorporating topics such as in-situ measurements, plasma transport in electromagnetic fields, plasma diagnostics, and computer-aided process development. Furthermore, the session will cover digital methods to understand and control thin film deposition processes, encompassing topics such as simulations, small and large-scale data analysis, in-situ process feedback control, and real-time optimization related to PVD technologies. Potential application areas include deposition technologies in use for wear-protective coatings for components and tools, low-friction thin films, carbon-based coatings, high-temperature wear-, erosion-, and corrosion-resistant coatings, optical layers, biomaterials, decorative coatings, and materials for energy applications.

**PP1 Invited Speakers:**

### PP2: HiPIMS, Pulsed Plasmas and Energetic Deposition

The energy carried to the thin film during deposition is crucial in reducing the growth temperature and improving the properties of thin film materials. Higher plasma density leads to enhanced ionization of the film precursors and offers better deposition process control. This results in improved coating characteristics, valuable e.g., mechanical, electrical and optical applications. This session solicits contributions from academia as well as industry and covers both the physics and the applications of energetic deposition. Topics of interest include plasma generation and discharge physics, plasma surface interaction and diagnostics, modeling and data-driven process understanding and simulations, reactive processes and process control, deposition processes adapted for nitrides, oxides and carbon-based coatings, mechanisms of film growth, surface and interface engineering, industrial applications and production, upscaling, and associated equipment.

**PP2 Invited Speakers:**

*Jiri Capek*, University of West Bohemia, Czechia

### PP3: CVD, ALD, and Laser-based Deposition & Microfabrication Technologies

This session explores thin film deposition and microscale fabrication techniques based on chemical vapor deposition (CVD), atomic layer deposition (ALD), and laser/plasma-assisted methods. The processes covered include LPCVD, MOCVD, PECVD, PEALD, and laser/plasma-based structuring, enabling functional coatings, selective area processing, and nanostructured interfaces. Topics include novel precursors, in situ diagnostics, surface engineering, and multiscale modeling. Contributions addressing the theoretical modeling of the role of lasers and plasmas on chemical reactions that govern the film growth are also encouraged. The session highlights interdisciplinary strategies for structuring and engineering surfaces at micro- and nanoscales, enabling applications in electronics, energy, catalysis, and biomaterials.

**PP3 Invited Speakers:**

*Francisco Aguirre-Tostado*, Center for Research in Advanced Materials (CIMAV), Mexico, "ALD and Aerosol-Assisted CVD for Surface and Interface Control in Perovskite LED Structures"

*Andrei Kolmakov*, NIST, USA, "In- Plasma XPS: a New Metrology Tool for Process Control"

*Abderrahime Sekkat*, Institut National Polytechnique de Toulouse, France, "Unveiling the Potential of Transparent Conductive Materials by Atomic Layer Deposition: From Process Synthesis to Functionalization"

**PP4: Greybox Models for Wear Prediction**

The prognosis of the wear behavior of coated tools and components is still unsolved and sufficiently accurate models to predict the wear behavior do not yet exist. Methods of machine learning in combination with conventional simulation approaches offer high potential to tackle this issue. By using these methods, the understanding of the wear mechanisms and the forecast of wear development and lifetime can benefit. Consequently, tool and component development as well as machining processes and applications can be improved by an adjustment of the process parameters or by an adjustment of the coatings deposited on the tools or components in order to achieve a higher productivity and a longer lifetime. Regarding wear prognosis, “Whitebox” models, based on physical laws and analytical correlations, represent the state of the art to determine the behavior of, for example, tools during the cutting process. Nevertheless, for a very complex and non-linear system behavior like wear progress of tools, whitebox models are limited. One possibility to predict non-linear behavior is offered by data driven “Blackbox” models, mostly based on machine learning algorithms. To utilize the benefits of whitebox and blackbox models and to overcome the limitations of both, they can be combined into “Greybox” models. This offers great potential to improve prediction accuracy of wear and remaining service life. The session welcomes contributions that address wear prognosis of coated tools or components by conventional simulation approaches in combination with data-driven models. Emphasis can be directly on greybox approaches or on particular analytical or data-driven models. Of particular relevance will be whitebox models that combine coating properties and behavior in processes and contribute to an increased prediction accuracy of established models. Also, welcome are contributions to blackbox models for high-performance applications with coated tools or components. In particular, the need for blackbox models should be described, and how these models can be combined with whitebox models to form greybox models. Moreover, the greybox modelling approach can be extended to other applications of the coating industry in the future. Contributions to this topic from scientists and from industry in the fields of coating technology, production, mathematics and information technology are very welcome to contribute to the session and present their work.

**PP4 Invited Speakers:**

*Brad L. Boyce*, Sandia National Laboratories, “Multimodal Joint Embedding for Combinatorial PVD Process-Structure-Property Correlations”

**PP5: Plasma and Vapor Deposition Processes (Symposium PP) Poster Session**

## ***Symposium MA (Materials A): Protective and High-temperature Coatings***

Symposium MA focuses on surface engineering and materials science of protective and high-temperature coatings. The interaction of coating materials with harsh environmental conditions is addressed, including high-temperatures, thermochemical environments as well as mechanical loads. The environmental impacts include phenomena such as thermomechanical wear (e.g., abrasion, erosion, or mechanical stress), high-temperature aging, corrosion (e.g., oxidation, sulfidation, carburization, and water-accelerated degradation), or catalytic and physical fouling (e.g., coking, ash fouling, and slagging). The symposium also addresses coating deposition processes, architectural designs, and process-structure-property relationships of protective coatings. The protective coating materials range from metallic alloys to ceramics such as nitrides, borides, oxides, or carbides. Furthermore, specific alloying strategies such as high entropy alloys (HEAs) and other multi-principal-element materials obtaining unique chemical and physical properties are of interest. The application areas span the energy generation, the aviation sector as well as machining industry highlighting new developments towards zero GHG emission and sustainability.

**MA1: Coatings for High Temperatures and Harsh Environment Applications**

This session focuses on the design, development, synthesis, and performance of coatings intended to resist high-temperature oxidation, corrosion and fouling. This includes protective coatings as well as thermal and environmental barrier coatings, which are crucial components in advanced technologies such as steam, gas and hydrogen turbines, jet engines, concentrated solar power plants (CSP), advanced nuclear reactors, petrochemical and gasification plants, waste incinerators, metal-forming, recycling industries and solid oxide fuel cells (SOFC) and electrolysers (SOEC) for hydrogen production. The demand for effective solutions is heightened in harsh environments characterized by exposure to steam, supercritical carbon dioxide (SCO2), molten salts, liquid metals, hydrogen, ammonia, biofuels, and similar substances. The research challenges involve coating development, process optimization, and the exploration of innovative processing techniques. Key areas of focus include the characterization of coatings and reaction products, understanding degradation mechanisms, modelling fabrication and degradation processes, and

assessing the lifetime and performance under operationally relevant conditions (including atmosphere, stress, cycling, erosion, abrasion and CMAS attack).

**MA1 Invited Speakers:**

*Radoslaw Swadzba*, Lukasiewicz Research Network - Uppersilesian Institute of Technology, Poland

### MA2: Hard and Nanostructured Coatings

This session welcomes contributions related to the characterization, simulation, development, and application of hard coatings and surfaces, including the relationships among composition, microstructure, chemical and mechanical properties, and the influence of deposition conditions on those parameters. The session also covers multifunctional nanostructured coatings, including nanocomposite, multi-component, and layered films with designs adapting the microstructure down to the nanoscale level. The session emphasizes the design, synthesis, and characterization of novel coating concepts, their modelling, and applications, as well as the development and use of novel characterization techniques, bridging both theoretical and practical aspects of hard and smart coatings.

**MA2 Invited Speakers:**

### MA3: High Entropy and Other Multi-principal-element Materials

High entropy alloys (HEAs) and other multi-principal-element materials are multi-component systems in which high entropy of mixing, or kinetic effects, stabilize a solid solution. They exhibit unique chemical and physical properties and have therefore recently attracted a growing interest in the materials science community. This session will be a platform for thin film-related research on high entropy and multi-principal-element materials including metal alloys, carbides, nitrides, and oxides as well as other multi-component systems in which high entropy affects phase stability. Topics of interest include but are not limited to, modelling, thin film processing, and characterizations of HEAs and other multi-principal-element materials.

**MA3 Invited Speakers:**

*Alexander Kirnbauer*, TU Wien, Austria, "On the Structure and Properties of Refractory-Metal-Based High-Entropy Metal-Sublattice Ceramics"

*Frédéric Schuster*, Université Paris-Saclay, CEA, France, "Machine Learning Assisted Design of Complex and High Entropy Alloys by Hybrid HIPIMS/Pulsed DC PVD Process for Low Carbon Energy Applications in Extreme Environments"

### MA4: Boron-containing Coatings

Borides and boron-containing thin film materials are emerging as the next generation of hard, wear-, oxidation-, and corrosion-resistant coatings. Furthermore, various boron-based materials exhibit unique properties obtaining high potential for functional and architectural designs. The aim of this session is to provide a platform for first-principles design, synthesis, characterization of properties and defect structure as well as applications of different types of boron-containing protective and functional thin films.

**MA4 Invited Speakers:**

### MA5: Protective and High-temperature Coatings (Symposium MA) Poster Session

## *Symposium MB (Materials B): Functional Thin Films and Surfaces*

This Symposium focuses on thin films, coatings, and free-standing architectures with specific functionalities, in particular those based on electronic structure or nanodimensions. The content encompasses design and synthesis of novel materials; processing and integration into products and devices; fundamentals of operation; and characterization of advanced functionality for a range of applications divided into the following sessions:

### MB1: Optical Materials and Thin Films

Current applications of optical materials, thin films, and advanced structured materials impose extreme demands on their synthesis and performance. The optimization of these devices, from design to applications, can be facilitated by optical characterization methods such as spectrophotometry, ellipsometry, scatterometry, interferometry, vibrational spectroscopies, near-field microscopies, and other light-matter interactions. We welcome contributions in the design, synthesis, characterization, and applications of thin films and nanostructures for optical applications.

**MB1 Invited Speakers:**

### MB2: Thin Films for Emerging Electronic and Quantum Photonic Devices

This session explores advancements in functional thin films for emerging electronic and quantum photonic devices, focusing on their material characteristics such as electronic, optical, piezoelectric, magnetic, superconducting and MEMS device properties. These properties are crucial for optimizing device functionality. The session emphasizes the importance of leveraging thin film growth to tailor specific properties like electrical and thermal conductivity, optical properties, thermal and mechanical stability, and magnetic characteristics to meet diverse device requirements. The session also covers quantum photonic materials—engineered thin films and heterostructures that

enable quantum light control for applications in communication, sensing, and computing. Furthermore, the session covers emerging trends in the electronics and quantum industry and their implications for thin film applications. It includes advancements in CMOS and beyond CMOS nanoelectronics, quantum-enabled photonic circuits, advanced sensors, low-power IoT devices, solid-state lighting, flexible displays, bioelectronics, and biosensors. Scalable, cost-effective, sustainable, and environmentally friendly thin film deposition processes are discussed, considering various substrates including flexible ones. The session also examines innovative thin film deposition manufacturing techniques such as vacuum-based technologies, and printing technologies, along with advancements in testing and characterization methods for thin films. Join this session to explore the latest progress in thin film systems for next-generation electronic and quantum technologies. Discover how these materials enhance device performance, respond to emerging industry demands, enable various thin film functionalities, integrate with biological systems, and propel innovations in sensing, AI, and quantum computing.

**MB2 Invited Speakers:**

### MB3: Low-dimensional Materials and Structures

This session focuses on harnessing nanoscale phenomena and innovative deposition strategies for nanomaterial-based thin films and coatings with application-oriented functionalities. Advances in the synthesis, including nanosources, and applications of various classes of low-dimensional materials will be addressed covering mono- and multi-component 2D and 1D objects, nanoclusters, nanoparticles, nanofluids, heterostructures, and thin films composed of 2D, 1D and 0D structures. The areas of interest include experimental, theoretical, and computational research in low-dimensional materials with controlled properties, cutting-edge investigation of processing-structure-property relationships, and novel application concepts or prototypes based on such materials. The session will provide a unique platform for connecting researchers with diverse academic and industrial backgrounds, including materials science, physics, and chemistry, and a forum for the discussion of fundamental issues and recent developments in the synthesis of low-dimensional materials as well as the ways to apply them in the next generation applications.

**MB3 Invited Speakers:**

*Stela Canulescu*, DTU Electro, Denmark, "Shape-Tailored Light Harvesting in Transition Metal Dichalcogenide Nanostructure for Unconventional Light-Energy Harvesting"

### MB4: Functional Thin Films and Surfaces (Symposium MB) Poster Session

## *Symposium MC (Materials C): Tribology and Mechanics of Coatings and Surfaces*

This Symposium covers all aspects of tribology, mechanical properties, and adhesion of coatings and engineered surfaces. The scope includes both experimental investigations and modeling of static (e.g., indentation and adhesion) and dynamic (e.g., oscillating, scratching, sliding, and rolling) contacts, and contact/fracture mechanics from atomistic to macroscopic length scales. We welcome contributions that improve scientific and mechanistic understanding of tribo-mechanical responses, characterization and performance of engineered surfaces and coatings, processing-structure-property-performance relationships, design of coatings for specific applications, and size effects. Additional emphasis is given to multifunctional (hard and lubricious) and nanocomposite coatings for extreme environments, nanostructured coatings, diamond and diamond-like carbon, and coatings for advanced aerospace, automotive, and machining applications, along with advances in instrumentation and measurement techniques.

### MC1: Friction, Wear, Lubrication Effects, & Modeling

This session covers all phenomena related to friction, wear, lubrication, and modeling. We solicit contributions on the development, characterization and modeling of materials, coatings or innovative structures to control friction and wear, including liquid and solid lubrication. We are interested in studies providing new understanding of tribological mechanisms of coatings and thin films. Emphasis will be given to contributions on understanding the role of coating composition and structure in friction and wear reduction. Incorporation of additional coating functionalities (thermal cycling resistance, fracture toughness, oxidation resistance, etc.) is also an important issue. Contributions on theoretical and computational modeling of tribological interactions at the atomic or molecular level are also welcome.

**MC1 Invited Speakers:**

*John Curry*, Sandia National Laboratories, USA

*Ali Erdemir*, Texas A&M University, USA

*Young-Jun Jang,* KIMS, Republic of Korea, "Effect of Mo-N-Cu Doping on the Microstructure, Mechanical, and Tribological Properties of Thick Tetrahedral Amorphous Carbon (ta-C) Coatings for Cryogenic Applications"

### MC2: Mechanical Properties and Adhesion

This session is devoted to the measurement and modeling of mechanical properties of surface and near-surface regions of thin films, coatings, and surface-engineered bulk materials. We are interested in measurement methods and models for the quantitative determination of mechanical properties, residual stresses, interface adhesion, fatigue, and fracture toughness. Emphasis will be given to contributions on novel test methods, such as in situ testing in SEM or TEM, multi-axial contact mechanics, MEMS test beds, and new approaches for the extraction of mechanical and constitutive properties by modeling of indentation load-displacement curves. Finally, special consideration will be given to contributions that address processing-structure- mechanical property relationships across multiple length scales.

**MC2 Invited Speakers:**

*Megan Cordill*, Erich Schmid Institute of Materials Science, Austrian Academy of Sciences, Leoben, Austria
*Damien Faurie*, Laboratoire des Sciences des Procédés et des Matériaux (LSMP), CNRS Paris, France

### MC3: Tribology of Coatings and Surfaces for Industrial Applications

Surface engineering and advanced coatings contribute to improved tribological properties and performance in many industrial applications. This session welcomes contributions on the development, characterization, and mechanical as well as tribological evaluation of coating solutions and surface functionalization in industrial applications, e.g. transportation, production technology. Thin film coatings, diffusion treatments as well as other types of coatings and surface treatments are welcome. Special consideration will be given to contributions that address overarching investigations to link fundamental insights with application results.

**MC3 Invited Speakers:**

*Andy Korenyi-Both*, Woodward, USA
*Oyelayo Ajayi,* Argonne National Laboratory
*Dominik Stangier,* Oerlikon Balzers, Liechtenstein
*Volker Weihnacht,* IWS Fraunhofer Dresden, Germany

### MC4: Tribology and Mechanics of Coatings and Surfaces Poster Session

## *Symposium MD (Materials D): Surface Engineering of Biomaterials, Devices, and Regenerative Materials: Health, Food, and Agriculture Applications*

This Symposium focuses on the practical applications of the synthesis, characterization, and performance (both in vitro and in vivo) of coatings and modified surfaces designed for biomedical applications, including health, food and agriculture. The symposium is devoted to creating a friendly hub platform to promote research discussions between material scientists, engineers, coating experts, nanotechnologists, and clinicians. Papers are solicited in areas related to bioactive and biocompatible coatings for implants (e.g., orthopedic, dental, spinal, etc.), cardio-vascular stents, drug delivery, and biosensing. Examples of research topics sought are hydroxyapatite coatings, biomimetic and bio-inspired coatings, antimicrobial, anti-biofouling, drug-eluting coatings, blood-compatible coatings, electrospun coatings, biofunctionalization of materials surfaces such as tissue engineering scaffolds by wet chemical and plasma methods, cell-surface interactions, bio-lubrication and bio-tribology, and processing and characterization of biomaterial surfaces. Studies of the interactions between coatings and the biological environment, including tribocorrosion and other degradation mechanisms, are also welcome. Moreover, research on the effect of biomaterial coatings on biological behavior, such as cell growth, adhesion, and gene expression, is sought. Contributions in retrieval implant analysis, releasing metal ions/particles, smart/intelligent surfaces, and potential clinical concerns will also be considered. A new key interest is the applications of coatings in additive manufacturing, as many novel 3D-printed implants benefit from surface coatings to promote osseointegration and, more generally, biocompatibility.

### *MD1. Coatings and Surfaces for Medical Devices: Mechanical, Corrosion, Tribocorrosion and Surface Processing*

This session addresses coatings and surface modifications utilized in biomedical applications. These modifications aim to enhance the performance characteristics or provide additional functionalities to implants, medical devices, or surgical instruments. The coatings and surface modifications serve various functions, including improving biocompatibility, promoting cell proliferation and viability, reducing restenosis, preventing thrombus formation, regulating metallic ion release, and resisting corrosion, wear and fatigue tribocorrosion, and wear. These functionalities are evaluated in both laboratory settings (in vitro) and within living organisms (in vivo). In addition, the regulated biological responses to the surfaces can be utilized for diagnostic and monitoring purposes, such as early prediction of diseases such as cancer or neurological disorders, through readily available body fluids, urine, or saliva. This session seeks to explore clinical applications and physiological responses to material systems used for tissue regeneration, implantable sensors, and smart drug delivery, among other things. The scope extends to computational, analytical, and experimental studies investigating coated biomaterials' underlying mechanisms and diverse behaviors. Your research, with its potential to directly contribute to these practical applications, holds

immense value for the advancement of the field. We encourage you to share your findings and insights with our community of researchers and practitioners.
Keywords: Coatings and Surface modifications of biomaterials, Corrosion, Tribology, Tribocorrosion, 3D printing/additive manufacturing, Implants, Retrieval studies, recent advancements in surface characterization techniques.

**MD1 Invited Speakers:**

*Ryan Bock*, SINTX, USA
*Paulo Lisboa-Filho Noronha*, UNESP, Brazil, "Covalent Immobilization of Antimicrobial Peptides (AMPs) onto Porous Titanium Oxide Surfaces: A New Strategy to Fight Infections"
*Thomas Liskiewicz*, Manchester Metropolitan University, UK, "Fretting-Corrosion of DLC Coating Systems"
*Alessandro Ralls*, Blue Origin, USA, "Tribology of Coatings/Films for the Biomedical and Diverse Application"
*Andranik Sarkissian,* Plasmonique, "Challenges in Materials for Health, Energy and Environment by Low Vacuum Glow Discharge"

**MD2: Coatings and Sensors for Health, Food and Agriculture: Antibacterial, Bioactive, and Flexible Interfaces**

The communication interactions between cells/bacteria and biomaterials occur through the surface of the biomaterials. The surface characteristics encompass its topography, chemistry, mechanical properties, surface energy, and redox potentials. These interactions initiate either desirable or undesirable processes. For instance, they can activate signaling pathways that regulate cell adhesion, migration, proliferation, and differentiation into specific desired cell types for various applications. However, they can also facilitate excessive adhesion of microorganisms, leading to the formation of biofilms that pose significant health risks. Gaining a comprehensive understanding of these interaction processes and their relationship with surface properties is crucial knowledge that enables us to create new surfaces or coatings capable of promoting specific biological responses, thereby designing bioactive surfaces. The session welcomes abstracts on the new generation of biomaterials based on regenerative medicine and tissue engineering, potential applications in health, food and agriculture. Recent developments in surface engineering/coatings such as 3D bioprinted bones and tissues, functionally graded materials, nature-mimetic biomaterials, and computational models/AI-driven technology in health and food and agriculture will be strongly recommended for submission.
Keywords: Biocompatibility, Antibacterial properties, Biointerphases, Cell-Material interaction pathways and Mechanisms, Regenerative materials and surfaces, Tissue engineering, 3D Bioprinting, Computational model and AI-driven biomaterials, Biosensors and diagnostic devices.

**MD2 Invited Speakers:**

*Dutt Ateet*, UNAM, Mexico, "Potential Application of Optical Sensor for Biomedical Application"
*Yu-Jui Fan*, TMU Research Center of Biomedical Devices, Taiwan , "Metallic-Capped Nanoslit Structure Integrating with Microfluidic Devices for Biosensing Applications"
*Laurent Houssiau*, Namur Institute of Structured Matter, Belgium
*Dhar Madhu*, Tennessee Institute of Regenerative Medicine, USA, "Integrating Material Science with Biology to Advance Tissue Engineering and Regenerative Medicine"
*Stephan Reuter*, Polytechnique Montréal, Canada
*Goel Sanket*, BITS-Pilani, Hyderabad, India, "Smart Biosensor: Where Are We Now?"
*Eloisa Sardella*, University of Bari Aldo, Italy, "Plasma-Treated Liquids in Medicine: Let's Get Chemical"

**MD3: Surface Engineering of Biomaterials, Devices and Regenerative Materials: Health Food, and Agriculture Applications Poster Session**

## ***Symposium CM: Advanced Characterization, Modelling and Data Science for Coatings and Thin Films***

This Symposium focuses on recent advances in microstructural, chemical, electrical, optical, and mechanical characterization of coatings and thin films, as well as advanced modelling and computation techniques, which enhance our understanding of the fundamental structure-property-processing relationships. In addition, the symposium will cover topics related to high-throughput thin film development including combinatorial synthesis, automated characterization and data science approaches such as machine learning or artificial intelligence for large data processing. Of interest are contributions that either highlight the application of recent advances in analytical methods, characterization techniques and nano-mechanical testing methods for coating evaluation, or present advanced and innovative modelling techniques to understand coating properties.

**CM1: Spatially-resolved and in situ Characterization of Thin Films, Coating and Engineered Surfaces**

This session deals with novel spatially-resolved structural/chemical and microstructural characterization techniques, especially those that advance the in-depth understanding of the relationship between processing, structure and properties of thin films and engineered surfaces. Particular attention will be given to cutting-edge experiments providing in situ information on structure or microstructural evolution during growth or during post-

growth stimuli (mechanical, thermal, ...). Especially, the session will focus on the emerging area of three-dimensional microstructural characterization in small volumes, such as atom probe tomography, TEM characterization, FIB/SEM/EBSD tomography and ToF-SIMS 3D mapping, dynamic characterization of thin film growth, ellipsometry, wide- and small-angle X-ray/neutron scattering, reflectometry, micro-Raman spectroscopy, etc.

**CM1 Invited Speakers:**

*Nicolas Bonmassar*, University of Stuttgart, Germany
*Stephan Gerstl*, ETH Zurich, Switzerland
*Yujiao Li*, Ruhr University Bochum, Germany, "Accelerated Atomic-Scale Exploration of Phase Evolution in High-Entropy Alloys Using Combinatorial Processing Platforms (CPP)"
*Michael Meindlhumer*, Erich Schmid Institute of Materials Science, Austria, "In Situ Micromechanical Characterization of Nanocrystalline Materials Coupled with X-Ray Nanodiffraction"

**CM2: Advanced Mechanical -Physical Testing of Surfaces, Thin Films, Coatings, and Small Volumes**

This session focuses on cutting-edge mechanical and multi-physical characterization techniques for surfaces, thin films, coatings, and small-volume materials. Emphasis is placed on the development and application of novel methods that probe mechanical and electrical, thermal, magnetic, interfacial properties and/or exploring the interconnection with the mechanical behavior. Contributions that introduce innovative nanoindentation and micro- and nano-mechanical approaches and advanced physical characterization—particularly on coatings, thin films, and near-surface regions, including those prepared by focused ion beam (FIB) or other lithographic techniques—are highly encouraged. Studies that investigate relationships between microstructure and properties are particularly relevant. Multi-technique mechanical/physical testing—such as in situ experiments within SEM, TEM, Raman, and X-ray beamlines—are also welcomed. Moreover, we especially invite papers that explore characterization under non-ambient and extreme conditions, including high and cryogenic temperatures, radiation exposure, and hydrogen environments, cyclic loading and high strain rates. Understanding the effects of these conditions on deformation mechanisms, mechanical/physical properties and their coupling in coatings and thin films is of significant interest.

**CM2 Invited Speakers:**

*Xufei Fang*, Karlsruhe Institute of Technology, Germany, "Functional Dislocations in Oxides: Near-Surface Engineering and Extension to Thin Films"
*Jean Charles Stinville*, University of Illinois at Urbana-Champaign, USA
*Christophe Tromas*, University of Poitiers, France

**CM3: Data-Driven Thin Film Design: High-Throughput Experimentation, Simulation, and Machine Learning**

This session explores the synergistic integration of high-throughput experimentation, advanced computational methods, and data-driven approaches for accelerated thin film and coatings development. On one hand the session will cover the full spectrum of accelerated materials development from rapid materials synthesis—such as combinatorial or autonomous thin film deposition—to automated characterization techniques and the efficient management and analysis of large experimental datasets. Contributions are invited on recent advances in high-throughput research methods, including the application of data science, machine learning, and artificial intelligence to experimental workflows. On the other hand, the session covers computational and simulation tools as well as data science approaches for knowledge-based materials design and discovery. Here, topics of interest include the use of simulations and machine learning to understand material structures and properties across scales, rapid screening of compositional landscapes, and the generation, curation, and exploration of big materials data from both experiments and computations. By bridging experimental high-throughput synthesis, characterization, and computational modeling, this session aims to showcase the latest developments and foster interdisciplinary collaboration in data-driven thin film design.

**CM3 Invited Speakers:**

*Mahshid Ahmadi*, University of Tennessee, USA
*Andrea Crovetto*, DTU, Denmark
*Davi Febba*, NREL, USA
*Andrea Giunto*, UC Berkeley, USA, "High-throughput Synthesis and Characterization of Powder Materials"
*Yongtao Liu*, Oak Ridge National Laboratory, USA
*Vladan Stevanovic*, Colorado School of Mines, USA
*Ichiro Takeuchi*, University of Maryland, USA

**CM4: Advanced Characterization, Modelling and Data Science for Coatings and Thin Films (Symposium CM) Poster Session**

## ***Symposium IA: Surface Engineering - Applied Research and Industrial Applications***

This symposium will focus on applied research related to industrial manufacturing and application aspects of various surface engineering and coating technologies. Topics include recent advancements in surface engineering equipment and the application of PVD/CVD/ALD and allied deposition technologies for coatings and thin films in automotive,

aerospace, medical, semiconductors, dies, molds, components and tooling/cutting applications. Also of particular interest are surface treatments before and after the coating processes to enhance the performance of engineered surfaces, hybrid/duplex coating techniques, innovations in manufacturing practices, computational & Artificial Intelligence manufacturing techniques and cooperation between industry, research organizations, and academia to advance surface engineering applications.

### IA1: Advances in Application Driven Research and Hybrid Systems, Processes, and Coatings

The scope of this session is on the research results produced in cooperation between industry, research laboratories, and academia. One focus should be on companies that can present current status and achievements, as well as to address future development trends. Academic institutions are highly encouraged to present results of background research or contributions aimed at the development of the tailored solutions to meet the industrial demands of thin film and hard coatings applications. Applications of Machine learning, artificial intelligence and its adaptation to surface engineering will be of great interest. This session focuses on novel methods that employ combinations of several processes and systems during film deposition. Hybrid systems can combine different ionization sources, like lasers, hot filaments, hollow cathodes, electron- or ion-guns, etc. with conventional magnetrons or arc evaporators, in order to provide increased ionization, additional heating of the substrate, or to change the distribution of plasma density in the reactor. Hybrid systems can also combine different gas pressures, including atmospheric plasma activation, can use pulsed gas inflows synchronized with pulsed power, pulsed biasing, etc. Hybrid processes can integrate different mechanisms of production of species for film deposition, for example PVD with PE CVD. Contributions on organic-inorganic hybrid coatings and hybrid processes both at reduced and atmospheric pressures are also solicited.

**IA1 Invited Speakers:**

*Aleksey Yerokhin*, University of Manchester, UK, "Plasma Electrolytic Oxidation"

### IA2: Surface Modification of Components in Automotive, Aerospace and Manufacturing Applications

This session will cover manufacturing advances and application-oriented research and development on surface engineered products and technologies. Topics include surface modified or coated products/components in tribology, corrosion, high temperature, optical, magnetic, and allied technologies. Also, the new thrust in surface engineering in additive manufacturing and implementation of Artificial Intelligence in Smart Manufacturing. The focus is also on novel substrate preparation and pretreatment methods: nitriding, carburizing, boriding, or oxidation pre-treatments; intermediate etching treatment and interlayer design during the coating processes. The innovative technologies such as coating post-treatments, including laser, electron beam, annealing, ion implantation or mechanical/chemical/optical techniques, and integrated and/or novel treatments and process combinations are also of interest. The main criteria are that the surface engineering/coatings should be applied to semi/end products to enable/improve desired physical/chemical properties. The components used in automotive, aerospace, manufacturing, land-based and aero turbines, lasers, mining, oil drilling and fracking, construction machinery, sporting goods and farming equipment are of primary interest in this session. Papers dealing with aspects relating to properties, processes, performance, equipment, and industrial applications for such treatments are all welcome.

**IA2 Invited Speakers:**

*Nazlim Bagcivan,* Schaeffler Technologies GmbH & Co. KG, Germany

*Sal Rodriguez,* Sandia National Laboratories, "Enhancing Mechanisms for Increased Performance of Nuclear Reactor RHEA Coatings"

### IA3: Innovative Surface Engineering for Advanced Cutting and Forming Tool Applications

The requirements of manufacturing industries and recent innovative developments in coatings and surface engineering processes for advanced tooling applications are the focus of this session. Such applications include but are not limited to high-demanding sheet or bulk metal forming, plastics processing, die-casting as well as cutting operations of steel, cast iron and difficult-to-cut materials like high-temperature alloys or CFRP. Novelties related to the use of coating technologies like PVD arc, sputtering, HIPIMS, hybrid, electron beam as well as PECVD and CVD for application-oriented design of different coating materials, architectures and properties are welcome. Insights into the combined effect of tool geometry and adapted coatings are also in the focus of the present session. Furthermore, contributions highlighting the interaction of the coatings designed for cutting and forming applications with the ambient atmosphere and/or the counterpart materials including metallic alloys and polymers are within the focus of this session. Recent advances in additive manufacturing have benefitted mold and die industries. Papers which have a synergy between additive manufacturing and surface engineering of cutting and forming tool applications is also of interest.

**IA3 Invited Speakers:**

*João* Coroa, Teer Coatings, UK, "Development of in-Suit Cleaning Process and Customized Coatings on Numismatic Coinage Dies for Minting Industry"

## *Symposium TS: Topical Symposium on Sustainable Surface Engineering*

The United Nations (UN) have defined 17 Sustainable Development Goals (SDG) to pave the way for a future which is worth living for everyone. This mindset is emphasized at ICMCTF with the tagline 'Surface Engineering: Shaping Future Materials.' While sustainability aspects are more than welcome in all contributions from academic progress to industrial processes, the focused Topical Symposium on Sustainable Surface Engineering manifests the fact that state-of-the-art research and development in surface engineering must also account for sustainability. Individual topical sessions on batteries and hydrogen applications, catalysis and energy conversion as well as circular strategies for surface engineering are in line with SDG 7 'Affordable and Clean Energy,' SDG 12 'Responsible Consumption and Production' as well as SDG 13 'Climate Action.'

### TS1. Coatings for Batteries and Hydrogen Applications

The future of energy is driven by the overall goal to provide green and sustainable energy for all industrial sectors. All mobile and stationary applications will be affected by these changes. The achievement of these goals relies on green and sustainable energy generation but also on the ability to store this energy. Once electricity is generated with regenerative technologies it can be stored in batteries or transported using hydrogen as a carrier to its final destination and transferred to electricity again when needed. Electrochemical cells are key elements in hydrogen production and storage of generated electricity in batteries. Surface coatings and surface functionalization in these cells are providing key properties to enable and drive necessary reactions. Electrode surfaces must provide high electric conductivities and withstand harsh electrochemically corrosive environments. On the other hand, membrane assemblies must be functionalized and act as carriers for catalysts. In solid-state batteries coatings are needed for interface design between electrodes and electrolytes. Moreover, coating processes are needed for the application of active materials. Future technical and economic success in hydrogen generation and electricity storage is mainly driven by the developments related to these electrochemical cells. This topical session focuses on coatings and surface functionalization in electrochemical cells used in hydrogen applications, e.g. electrolysis, fuel cells, and in electricity storage, e.g. Li-batteries, solid state batteries, flow batteries.

**TS1 Invited Speakers:**

*Verena Lukassek*, The Hydrogen and Fuel Cell Center, Germany, "Investigation Methods for Coatings on Metallic Bipolar Plates for Fuel Cells and Electrolysis"

### TS2. Coatings and Surfaces for Renewable Energy Technology

Renewable energy production, industrial decarbonization, and pollution reduction are gaining attention as essential to address contemporary challenges for a sustainable future. This session seeks to establish a collaborative environment for researchers to present and share recent advancements in energy harvesting technologies and their applications, fostering a more sustainable tomorrow. It is specifically devoted to discussing materials and devices developed for various forms of energy conversion, including, thermoelectric, (photo)electrochemical, and mechanical energy conversion and further to self generating sensors or wearable technology. It includes the direct conversion from natural energy sources to electricity or the conversion from natural energy sources to fuels later used in other technology (e-/solar fuel generation). It encompasses both theoretical and experimental research pertaining to the design and processing of these systems. We welcome contributions for the following topic:

- Thermoelectric/Photo(electro)catalytic technology and power generation.
- Triboelectric/Piezoelectric nanogenerators.
- Self-generating sensors and Self-generating wearable technology.

**TS2 Invited Speakers:**

*Elisabetta Di Maggio*, Università di Pisa, Italy, "1D & 2D Material-Based Electronic Devices for Energy Harvesting and Sustainable Technology"

### TS3. Circular Strategies for Surface Engineering

The concept of a circular economy is a key element towards reaching the sustainable development goals (SDG) from the United Nations (UN) and comprises incentives to reuse existing products, instead of disposal and relying on the continuous global production for replacement. 'The goods of today are the resources of tomorrow at yesterday's resource prices'. Thus, natural resources can be used more efficiently and also new markets will evolve in a circular economy. In the last decades, the research and development within surface engineering has been focused mainly on the enhancement of surface properties by design of multifunctional coatings and surfaces, while the sustainability of such processes and products is usually neglected. However, the approach of a circular economy for surface engineering requires innovative rethinking along the lines of reduce, reuse, repair and recycle. These strategies exhibit both ecologic as well as economic incentives, which means that the significant lowering of greenhouse gas emissions during production is closely connected to business models for the future. Sustainability measures have

been widely implemented and exploited for immediate actions to enhance the longevity of products and materials within industrial surface engineering in the last years. On the other hand, insights and knowledge from basic academic research offer additional opportunities to enhance the sustainability of surface engineering products. Hence, this topical session provides a bridging platform for exchange on circular economy strategies for surface engineering between industry and academia. This exchange will benefit from innovative contributions on e.g. approaches for life cycle analyses, reduction of energy and material input, reusage of bi-products as well as repair and recycling of materials.

**TS3 Invited Speakers:**

*Stephan Krinke*, Fraunhofer IST, Germany, "Life Cycle Engineering: From Measurement to Development of Sustainable Surfaces"

*Lukas Zauner*, RHP-Technology GmbH, Austria, "Rethinking Resources: Circular Strategies in Target Material Production"

**TS1P: Coatings for Batteries and Hydrogen Applications - TS1 Poster Session**
**TS2P: Coatings and Surfaces for Renewable Energy Technology – TS2 Poster Session**
**TS3P: Circular Strategies for Surface Engineering – TS3 Poster Session**

## SPECIAL SESSIONS & EVENTS

### *Plenary Lecture (PL)*

***PULICKEL M. AJAYAN, Benjamin M. and Mary Greenwood Anderson Professor of Engineering, Department of Materials Science and Nanoengineering, Rice University***

***"Nano-Engineered Materials: Heterostructures and Composites"***
***Monday, April 20, 2026, 8:00 a.m.***

The last three decades have seen spectacular discoveries and developments in the field of nanotechnology. This talk will focus on some of these developments, particularly related to the opportunities and challenges in designing and controllably synthesizing functional nano-engineered materials. The talk will discuss several classes of materials, for example, carbon based and boron-nitrogen-carbon based materials, two-dimensional materials such as transition metal di-chalcogenides and their heterostructures, defect engineered materials and single-atom catalysts, interface controlled polymer nanocomposites and spark plasma sintered ceramic composites. I will also consider the impact of bottom-up engineering on the design of material systems relevant to many areas of applications. Several aspects including synthesis, chemical manipulation and hybridization will be discussed to address the opportunities that are available in creating novel nanoengineered materials.

### *Exhibitors Keynote Lecture (EX)*

***RYAN EVANS, Director of Research and Development, The Timken Company***
***"Surface Engineering Opportunities for Engineered Bearings and Industrial Motion Components"***
***Tuesday, April 21, 2026, 11:00 a.m.***

### *Keynote Lectures (KYL)*

A special feature of highlighted presentations offers added value to the technical program. Lectures are dedicated to topics of fundamental interest for scientists and engineers in surface engineering. Presentations are individual and not "classic" day-to-day R&D business. Discussion of new developments and trends of relevance to ICMCTF, both in materials science and in methodology, in a pioneering state, with long-term impact. Selected critical reviews in a field of relevance to ICMCTF. Recognition of colleagues with pioneering and lasting impact on ICMCTF.

**KYL1: Keynote Lectures**

*Krasimir Vasilev,* Flinders University, Australia, "Nanoengineered Materials and Coatings for Medicine and Beyond"

### *'FIRST TIMERS' SPECIAL*

We want to welcome new participants in 2026 with a special `First Timers` offer of ***free student registration*** for one student accompanying their adviser/supervisor registering for ICMCTF 2026 for the first time. Both the mentor and student must be first-time attendees, and both are required to stay in the conference hotel to be eligible for the offer. Please contact the ICMCTF 2026 General Chair, Peter Kelly (peter.kelly@mmu.ac.uk) if you have any questions regarding this opportunity.

## ***ICMCTF VENDOR EXHIBIT***

Visit the exhibit hall on Tuesday, April 21, from 12:00-7:00 p.m. and Wednesday, April 22, from 10:00 am – 5:00 p.m. to learn about new products, services and application techniques that will help improve all facets of R&D, Engineering, Manufacturing, Quality Control and general laboratory operations. This is a great opportunity for attendees to interface with vendors who are eager to introduce their products that will satisfy your laboratory requirements and your specific research criteria. The exhibit hall is also a great place for networking. Join us each day for lunch and the exhibit hall reception on Tuesday at 5:30 pm. For questions regarding the exhibits, please contact Bob Jonas/Ryan Foley at **exhibits@avs.org**

## ***Call for ICMCTF Awards***

1. ***Graduate Student Awards:*** The ICMCTF Graduate Student Awards are intended to honor and encourage outstanding graduate students in fields of interest to the Advanced Surface Engineering Division (ASED) of the AVS. ASED seeks to recognize students of exceptional ability who show promise for significant future achievement in ASED-related fields. The nominee must be a graduate student in science or engineering who is in good standing at a university with a recognized graduate degree program and the presenting author of an oral presentation at the annual ICMCTF conference. Nominees who receive their final research degree after the ICMCTF Abstract Submission deadline are still eligible for that year. However, previous Graduate Student Award winners are ineligible. Submission Deadline: October 27, 2025. Click here for **Nomination Procedures**.

2. ***Bunshah Award:*** The R.F. Bunshah Award and Honorary ICMCTF lectureship is intended to recognize outstanding research or technological innovation in the areas of interest to the Advanced Surface Engineering Division (ASED) of the AVS, with an emphasis in the fields of surface engineering, thin films, and related topics. The nominee shall have made pioneering contributions to the science or technology of surface engineering, thin films, or related fields of interest to ASED. Submission Deadline: October 27, 2025. Click here for **Nomination Procedures.**

3. ***Bill Sproul Award:*** The Bill Sproul Award and Honorary ICMCTF lectureship is intended to recognize the achievements of a mid-career researcher who has made outstanding scientific and/or technological contributions in areas of interest to the Advanced Surface Engineering Division (ASED) of the AVS, with an emphasis in the fields of surface engineering, thin films, and related topics. Submission Deadline: October 27, 2025. Click here for **Nomination Procedures**.

***ONLINE ABSTRACT SUBMISSION ONLY:*** **https://icmctf2026.avs.org/**
***Deadline: 11:59 pm ET, Monday, October 27, 2025***

**Supplemental data (1-2 pages, 1MB) will also be accepted via the submission site.**
**Instructions may be found at the website above.**

****Please Note: A presenter may present one (1) ORAL AND one (1) POSTER) presentation at ICMCTF****

**ORAL Sessions:** Rooms will be set up with projectors, screens, microphones, and laptops (PCs).

**POSTER Sessions**: Each poster presenter will be allotted space that is 4 feet wide by 4 feet high. Please make your poster no larger than 46 inches wide by 46 inches high to ensure it fits nicely into the allotted space. Any Questions? Please email icmctf@icmctf.org