European CMetAC

ECMetAC Newsletter No. 16

January 2026

Dear Colleagues,

On behalf of the board of Directors, we wish you a Happy New Year 2026! May this new year be filled with successful projects, stimulating collaborations, and exciting scientific discoveries.

With the ever-growing flow of information, a constant demand from the technological sector, and the need for optimising the use of resources and energy, expectations from Science and scientists have never been so high. One route to face everyday and upcoming challenges resides in developing strong expertise in various topics, often reached via strong collaborations. This is why it is so important that our network continues to train young scientists, to explore and deliver great results.

During our last exciting meeting in Dübendorf, we witnessed firsthand the next generation in operation. In this newsletter, we will have the opportunity to learn more about some of them, laureates/ orals or poster prizes. The list of distinguished upcoming talents can be found on our website. The year is already well underway with many meeting and conferences already planned. We would therefore like to invite you to add our next ECMetAC Days in Krakow in November 2026 to your calendars. And as a warm up, we will continue to exchange during workshops, online meetings or even better by mutual visits among partners.

Best wishes,

Julian Ledieu, Hem Raj Sharma, Marc Armbrüster, Jean-Pierre Celis and Émilie Gaudry

ECMetAC Days in Dübendorf

The 16th edition of the ECMetAC Days was organized by the nanotech@surfaces Laboratory at Empa, Switzerland from November 24 to 27, 2025. For the first time, the conference was hold in Switzerland and we could welcome 59 participants representing 13 institutions from 9 different countries. The conference was officially opened with greetings from Lorenz Herrmann, Director of the Department for Modern Materials and Surfaces at Empa, Julian Ledieu, Director of ECMetAC, and Roland Widmer from the organizers to formally launch the event. Besides a well-received workshop "Innovative Researcher: Discovering the Expert in Yourself" lead by Magdalena Wencka, the program featured 32 scientific talks and 17 poster presentations.

The program covered topics ranging from structure and properties to characterization and modelling of complex metallic alloys and stimulated many discussions not only highlighting new developments but also emphasizing the significant progress made by new metallic alloys

and compounds. Ample time for discussions has been given during session breaks and during the conference dinner, which took place in the historic and very scenic Zunfthaus zur Zimmerleuten downtown Zürich. During the conference dinner, four Young Scientist Awards were presented - details can be found below. Finally, it was announced that the ECMetAC Days 2026 will be hosted by the AGH University of Krakow in Poland.

Partner Spotlight: Materials Science at the Faculty of Materials Science and Technology, Trnava

At the laboratories of MTF STU, we offer opportunities for collaboration in the preparation and study of advanced metallic materials, such as high-entropy alloys. Materials are prepared by arc or induction melting under a protective argon atmosphere, with the possibility to tailor their shape and dimensions according to the requirements of subsequent experiments. Further heat treatment at temperatures of up to 1200 °C is available. We also offer microstructural and phase characterization. Microstructural analyses are performed using scanning electron microscopy (HR-SEM and FIB-SEM) in secondary and backscattered electron modes, combined with local chemical analysis by energy-dispersive spectroscopy (EDS). An incorporated indentation stage for micromechanical testing is also available. Phase identification is carried out using X-ray diffraction (XRD) and electron backscatter diffraction (EBSD). XRD measurements are conducted on a diffractometer equipped with multiple types of characteristic radiation (Co, Cu, Mo, Cr) and a Pixcel 3D two-dimensional detector, which enhances data acquisition efficiency. In addition, we offer an investigation of the properties of selected materials, particularly mechanical, thermal, and corrosion-related properties. Mechanical characterization includes hardness measurements, fracture-resistance testing, and tensile testing of small-volume specimens. Thermal properties are evaluated using dilatometry over a wide temperature range from -190 °C to 2000 °C, as well as thermal analysis combining DSC (DTA), thermogravimetric analysis (TG), and mass spectrometry (MS). The corrosion behavior of alloys is investigated using electrochemical methods in various corrosive environments, enabling assessment of material resistance to different forms of corrosion.

In addition, our accelerator laboratory enables advanced ion beam analysis, irradiation, and implantation studies. The facility is equipped with tandem and single-ended ion accelerators covering ion species from hydrogen to uranium and energies ranging from tens of keV up to 100 MeV. Available techniques include Rutherford Backscattering Spectrometry (RBS), Particle Induced X-ray Emission (PIXE), Nuclear Reaction Analysis (NRA), and Time-of-Flight Elastic Recoil Detection Analysis (ToF-ERDA), providing quantitative and isotope-sensitive elemental analysis, including channeling for crystal quality and radiation damage assessment. The infrastructure supports high-fluence irradiation experiments, ion beam synthesis of novel phases beyond equilibrium solubility limits, radiation hardness testing for nuclear and space applications, as well as in-operando studies of functional materials and devices. Thin-film and surface synthesis is further supported by combined ion implantation and physical vapor deposition techniques.

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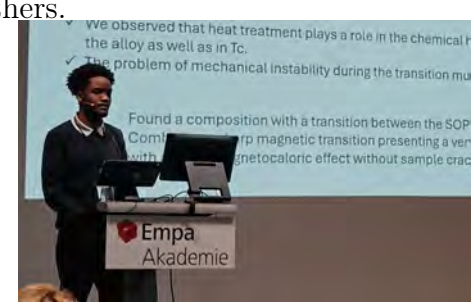
Meet the Award Winners - ECMetAC days laureates

Gabriela Opiła and Sihom Kwekam received the Best Oral Presentation Award. They are introduced below. Take a moment to get to know them!

My name is Gabriela Opiła, I'm a 4th year PhD student at the Faculty of Physics and Applied Computer Science at AGH University of Kraków (Poland), in the Department of Solid State Physics. In my research, I study magnetic and plasmonic properties of nanoparticles, specifically for SPION (Superparamagnetic Iron Oxide Nanoparticles) and for gold nanorods. Such nanomaterials exhibit potential in biomedical applications, like hyperthermia treatment, biosensing, and targeted drug delivery. Moreover, I'm interested in analysis of physical properties of meteorites, as a follow-up to my Master thesis project; space materials, both those that come from space, and those that can be used in space, fascinate me. This is what initially led me to join the Magnetic Bulk- and Nano-Materials Team at AGH and continue to work in this group. At the ECMetAC 2025, I presented my results related to gold nanorods synthesized using a seedless growth technique: plasmonic photothermal conversion, as well as physical characterization with STEM, XRD, and UV-Vis. In my free time, I enjoy photography, including astrophotography and mineral macrophotography.

My name is Dany Sihom Kwekam. During my Master's degree in Condensed Matter and Nanomaterials, completed in Université de Lorraine, I had the opportunity to work on high-entropy alloys for magnetocaloric applications. I found both the scientific subject and the research environment very stimulating, which motivated me to start a PhD in this field. During the ECMetAC Days held in Dübendorf, I presented my work in an oral contribution entitled *Promising Magnetocaloric Effects in Rare-Earth-Free High-Entropy Alloys*. I discussed the structural and magnetic properties of two alloy series: one derived from Ni_2MnGa and the other from NiMnSi. The results demonstrated that the reduction of the Curie temperature in the first system and the improvement of the structural properties in the second could make these materials promising candidates for magnetocaloric applications. I particularly appreciate the wide range of perspectives offered by my research, as it provides numerous opportunities for further investigation and development. I also greatly value the opportunity to participate in scientific conferences, present my research results, interact with other researchers, and exchange new ideas, which are among the aspects I enjoy most in my work. In addition, I have a strong interest in community and associative activities, as I value contributing through meaningful, voluntary work that directly benefits others.



Marek Novák and Sabrina Brusch were awarded the Best Poster Award of the ECMetAC conference. Their academic journey is outlined below. Discover their work and the context in which it was carried out.

Marek Novák is a PhD candidate and researcher in Progressive Materials and Materials Design at the Slovak University of Technology in Bratislava (STU). His doctoral research focuses on the radiation resistance of advanced structural materials for next-generation nuclear energy systems. He received a Bachelor's degree in Materials Engineering from the Brno University of Technology and a Master's degree in the same field from the Slovak University

of Technology. His master's thesis investigated the effects of transmutational helium on the radiation resistance of oxide dispersion strengthened (ODS) steels. Prior to his doctoral studies, Marek Novák gained professional experience in nuclear engineering and plant design. As a nuclear safety analyst at VÚJE, a.s., he was involved in thermohydraulic analyses, operational measurements, and nuclear safety assessments, including work related to the commissioning of Unit 3 of the Mochovce Nuclear Power Plant. He also worked as an Associate Piping Designer at McDermott International Inc., contributing to plant design through software-based piping layout development, stress analysis, and CAD modeling. His current research interests focus on radiation impact on advanced materials and their relevance for next generation nuclear and fusion systems. He is also actively involved in ion beam analysis, including the development of a resonant nuclear reaction analysis endstation at a the STU tandem accelerator beamline, and has a growing research interest in battery and hydrogen storage systems.

Driven by curiosity from an early age, Sabrina Brusch pursued studies in natural sciences and began her academic journey at the University of Konstanz, where she earned a Bachelor's degree in Nanoscience. During her Master's studies, she specialized in surface science and physical chemistry. Coming from a working-class family, she initially aimed for a career in industry and gained practical experience through an internship and part-time work at Sika, contributing to the development of automotive adhesives. Motivated to explore academic research, she completed a Master's thesis in the Nanotech@Surfaces group at Empa. Her research focuses on surface science investigations of intermetallic PdGa and GaNi surfaces using various analysis techniques. At the ECMetAC conference, she presented results on the structural and electronic properties of chiral GaNi111 surfaces. In addition she shared the results of LEED-I(V) measurments of three PdGa surfaces as well as studies on enantioselective adsorption and surface reactions on chiral PdGa. What she enjoys most about her work is the combination of learning various surface science techniques and gaining fundamental insights into intermetallic materials, while working in an interdisciplinary and international research environment.

Innovative Researcher: Discovering the Expert in Yourself

„Innovative researcher: ...“ – is a series of dedicated workshops that allows to researchers from our Network to enrich their experience in a new perspective coming from experts outside our field together with the scientists. This time we met on the Nov. 24th during the ECMetAC Days 2025 at the Swiss Federal Laboratories for Materials Science and Technology (EMPA) in Dübendorf in Switzerland. Eight researchers from among our Network worked on the development of their skills of being an expert during the workshop entitled “Innovative Researcher: Discovering the Expert in Yourself”. Joanna Janowicz (soft skills trainer, on-line) and Dr. Magdalena Wencka (physicist and innovation specialist, on-site) guided the meeting. During our training, we focused on how to strengthen and develop an expert identity, collaboration and innovative thinking. In our opinion, the three pillars of strengths (that we trained) belong to the following groups: cognitive (like synthesizing data, creating structures, formulating research questions), relational (collaboration, the ability to communicate ideas, supporting others, mentoring) and creative (combining diverse disciplines, unconventional interpretation, the courage to provoke new directions of thinking and trends). Another issue responsible for feeling comfortably as an expert is to identify our inner critic, which it consists of an impostor syndrome, perfectionism and comparing yourself with others. We learned that the mentioned above disruptors are not signs

of weakness but normal reactions of the brain, which protects us from the risk and evaluate potential threats. Thus, we trained transforming our inner narrative from "I am not competent enough" to "I am in the process of developing X and I am doing that by the Y". We also developed skills dedicated to the communication with the recipients of our scientific talks. Among others, to give a clear message we need to calm down our mind. The stress that we experience speeds up our voice, reduces precision, creates tension in the face and the shoulders and makes logical thinking more difficult. It is again normal and 3-breath rest, body grounding and proper intention frame may manage it consciously. Summarising, being an expert is a practice of everyday choices not only a matter of scientific degree and the age. Among many interesting discussions, we completed numerous tasks supporting our new perspective. All participants of our workshop had a chance to train newly acquired skills having their oral presentations during our ECMetAC Days 2025 conference. One of them was awarded a prize for his presentation in the category of "Young Researcher Best Oral Presentation". Let us congratulate him warmly! Regarding this year's developing workshop, please feel free to book a few hours in your calendars just before the Welcome party of the ECMetAC Days 2026 in Kraków (Poland) to meet again!

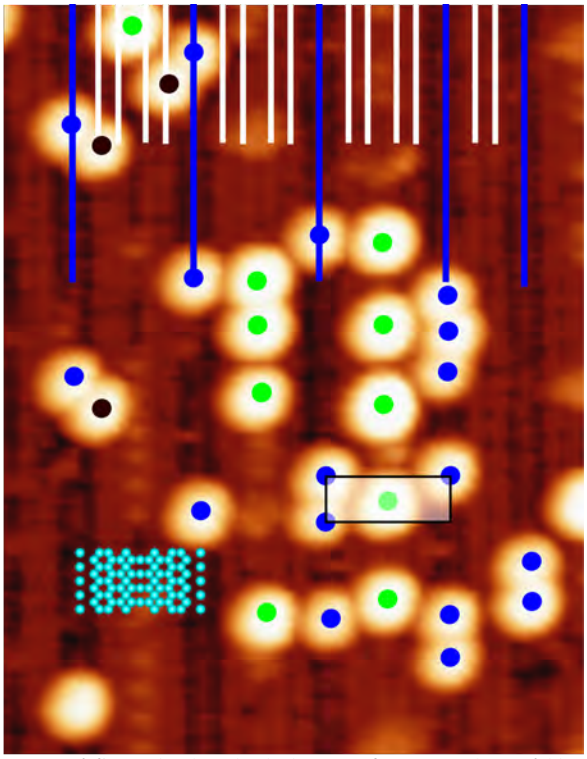
Participants of the EDI RAD workshop

Written by Dr. Magdalena Wencka, Institute of Molecular Physics, Polish Academy of Sciences, Poznań, Poland

Publication Highlight

Quasiperiodic arrays of finite-size C_{60} molecular chains induced by anisotropic growth

Researchers from the University of Liverpool report the controlled growth of C_{60} molecules on a decagonal Al-Ni-Co quasicrystal, forming finite-length molecular chains guided by surface anisotropy. Scanning tunneling microscopy shows preferential growth along the periodic direction, with chain spacing following a Fibonacci sequence. The self-limited chain length arises from competing molecule-substrate and intermolecular interactions, highlighting quasicrystals as effective templates for molecular nanostructures.



STM image of C_{60} molecules adsorbed at specific sites on the twofold surface of a decagonal Al-Ni-Co quasicrystal, arranged in a Fibonacci sequence.

Physical Review B **112**, 235402 (2025).

Upcoming Events

• **SCTE & IMC 2026**

15th-18th June, Lublin

SCTE IMC
Lviv - Lublin, 2026

The joint SCTE&IMC 2026 meeting, bringing together the 25th International Conference on Solid Compounds of Transition Elements and the XVI International Conference on Crystal Chemistry of Intermetallic Compounds, will serve as a forum to present and discuss new results on synthesis, characterization, properties, and applications of solid compounds of d- and f-elements, as well as intermetallic and related compounds. More information on the website.

• **Physics of Magnetism 2026**

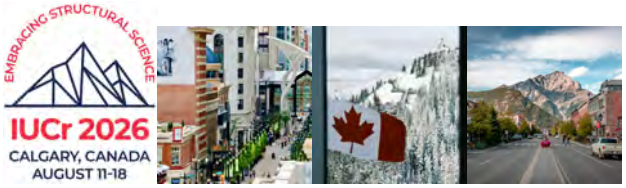
22th-26th June, Poznań

The European Conference PHYSICS OF MAGNETISM 2026 (PM'26) will be held on June 22-26 in Poznań, Poland. The current event is going to be the eighteenth in a series which started in 1975. The conference aims to be an international forum for the presentation and discussion of novel scientific ideas in the field of broadly understood magnetism and magnetic materials.

The meeting is organized jointly by the Institute of Molecular Physics, Polish Academy of Sciences and the Faculty of Physics and Astronomy, Adam Mickiewicz University, Poznań.

• **IUCr 2026 Congress**

11th-18th August, Calgary



The Twenty-Seventh Congress and General Assembly is set to be held in the magnificent city of Calgary, located in the heart of Alberta, Canada from August 11th-18th, 2026. More information and the list of symposia on the website.

• **ICCOCM 2026**

27th Sept - 2nd Oct, Evian

The next International Conference on Complex Orders in Condensed Matter (ICCOCM) will take place in Evian. This conference aims at fostering collaborations on the study of complex orders in condensed matter and in particular aperiodic order, local order, electronic order, magnetic order and 'hidden' order. Eminently interdisciplinary, this conference will review advances in the study of incommensurately modulated phases, quasicrystals and approximants, strongly correlated electron systems, disordered and amorphous systems, glasses with an emphasis on the influence of structural complexity on properties.

• **ECMetAC days 2026**

23rd-26th Nov., AGH Univ., Kraków,

The next ECMetAC Days will be held in Kraków, the heart of Polish science and culture, at the AGH University (November 23-26, 2026). The conference venue, along with catering and accommodations, will be conveniently located on the AGH campus, near the Old Town. Let us remind that the AGH University has already hosted participants of C-MAC Days in Krakow, in 2012.

AGH

The conference provides an excellent opportunity to present the results of scientific, experimental, and/or theoretical research, promote young scientists, PhD students, and students in gaining experience in scientific presentations, and establish and strengthen collaboration be-

tween partner laboratories or departments operating in the areas of research and activities (RAD) and beyond.


The conference venue: ACMiN (AGH campus)


The Old Town of Krakow

The scope of the conference includes formation, stability, synthesis, structural and chemical characterization, physical, chemical, and mechanical properties of bulk materials, surfaces and thin film materials, catalysis, DFT calculations, applications, and new frontiers in metallic materials. The materials of interest are conventional crystalline intermetallics, complex metallic alloys, quasicrystals, and other aperiodic solids and soft matter, metallic glasses, high-entropy multicomponent alloys, intermetallics for catalysis, strongly correlated-electron systems, energy and quantum materials as eg. thermoelectrics, magnetocalorics, metallic alloys for various applications. The topics are highly interdisciplinary and include mathematics, physics, chemistry, metallurgy, and materials science.

You are all kindly invited to AGH University and Kraków!

The ECMetAC Days 2026 is organized by Prof. Janusz Tobola and the team from Department of Condensed Matter Physics (Faculty of Physics and Applied Computer Science, AGH University).

- **Aperiodic 2027**

27/06–02/07, AGH University, Kraków

The XII International Conference on Aperiodic Crystals (APERIODIC 2027) will be the next meeting in a series of conferences supported by the Commission on Aperiodic Crystals (CAC) of the International Union of Crystallography (IUCr), organized triennially on different continents. The most recent meetings took place in Caen (France, 2024), Sapporo (Japan, 2022), Ames Iowa (the USA, 2018), Prague (Czech Republic, 2015), Cairns (Australia, 2012), Liverpool (UK, 2009), Zao (Japan, 2006), Belo Horizonte (Brazil, 2003), Nijmegen (The Netherlands, 2000). Aperiodic XII provides an excellent opportunity to learn about new results in the field of aperiodic crystals, including incommensurately modulated phases, composite crystals, and quasicrystals. All related topics are warmly welcomed! Aperiodic 2027 also offers an opportunity for researchers working in these fields to exchange ideas and encourage collaborations with other research groups, hence promoting material science and engineering. The conference venue will be located on the campus of AGH University, within walking distance of the historical center of Kraków.

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