

European Integrated Center for the Development of New Metallic Alloys and Compounds

ECMetAC Newsletter No. 10

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Dear colleagues of the ECMetAC network,

Best wishes for 2023 from the Executive Board!

This year again we will have great opportunities to interact and develop new collaborations during one of the numerous conferences ahead. There is nothing like a one-to-one discussion to foster new ideas and to strengthen existing partnerships. Picking up a personal badge rather than clicking online and remaining behind a camera is a welcome return for all of us, and a new effervescent experience for many young scientists. This will include for instance the ICQ15 supported by our network.

This year ECMetAC will visit Sweden for the first time, gathering in Uppsala for the Euroschool 2023. Then, later we will meet in Slovenia for our annual ECMetAC Days. Until then, several workshops will be organised by our Research and Activity Domain (RAD) speakers. We encourage also the use of the Young Scientist Exchange fellowship for scientific visits to partners and for joined experiments. Finally, please send us your latest results and job opportunities and we will be happy to post them on our website!

We are looking forward to seeing you soon!

Stay healthy and best wishes.

Julian Ledieu, Ronan McGrath,
Marc Armbrüster, Jean-Pierre Celis
and Émilie Gaudry

Research and Activity Domain "Equality and diversity in material science" becomes "Equality, Di- versity and Inclusion in Materials Science"

by Dr. Magdalena Wencka



On the Nov. 24th 2022 a Governing Body of our Network has approved a change of the Equality and Diversity in Material Science RAD adding the inclusion. While the equality means treating everyone fairly, recognizing that everyone has individual needs and the right to have those needs respected, the diversity is the unique characteristic, perspective and life experience that define us as individuals and which should be valued and appreciated. At the same time inclusion as the broadest one highlights importance of creating a togetherness among individuals possessing various abilities, backgrounds, ages, races, religions, genders, etc. A spirit of being inclusive is to show an initiative and an empathy toward the others building compassionate, welcoming, respectful and united society at the same time. Inclusion is a kindness and honoring others, sharing values among each other, appreciating individualities, making each

¹ <https://news.montgomeryschoolsmd.org/staff-bulletin/all-in-diversity-inclusion-and-equity-in-education/>

other comfortable and celebrating being united. The culture of inclusiveness causes teams-in-science satisfied and consolidated, the same increasing their effectiveness. The equality asks “what barriers stop researchers accessing their team?” while the diversity asks “who is accessing the team?”. The question of the inclusion is “does everyone feel belonging to the team?”. More useful information is available in the Equality, Diversity and Inclusion in Material Science [RAD tab](#) at our network web site.

Reports

Workshop ECMetAC dedicated to “High-Entropy Alloys”

by Dr. Magdalena Wencka

During our annual network conference, the 2nd Workshop ECMetAC dedicated to „High-Entropy Alloys: from basic studies to industrial applications” was held in Split on Nov. 21st. Like a year ago, we scheduled scientific sessions dedicated to structure, surfaces and physical properties. To summarize especially freshly published scientific results on HEAs we met at a round table to discuss trends in the development and applications of high-entropy alloys. The opening lecture “Eutectic high-entropy alloys and refractory high-entropy alloys: Opportunities and challenges” was presented by the world expert on HEAs prof. Sheng Guo from the Department of Industrial and Materials Science, Chalmers University of Technology, Göteborg, Sweden. The two invited lectures were presented by prof. Anton Meden “Phase identification and quantification in high entropy alloys using X-ray powder diffraction” (University of Ljubljana, Faculty of Chemistry and Chemical Technology, Ljubljana, Slovenia) and prof. Mark Armbrüster “HEAs in catalysis – an overview” (Institute of Chemistry, Chemnitz University of Technology, Germany). Our workshop was dedicated to honour scientific achievements of prof. Janez Dolinšek, the

head of the JSI High-Entropy Alloys Group (Jožef Stefan Institute, Ljubljana, Slovenia) for his 65th Birthday Anniversary. At the end of the day, together with Janez we shared also an occasional cake. The workshop was chaired by dr. Magdalena Wencka from the JSI High-Entropy Alloys Group (Ljubljana, Slovenia).



Prof. Janez Dolinšek as the honorary chairing person of the 2nd ECMetAC Workshop on „High-Entropy Alloys: from basic studies to industrial applications” that was held in Split on Nov. 21st (left) and as the birthday celebrant (right).

ECMetAC Days 2022, Split, Croatia

by Prof. Ante Bilušić



After two years of being held online, the ECMetAC Days was finally held onsite with 60 attendees. It was organized by Prof. Ante Bilušić and his team at the University of Split, Faculty of Science, from November 21-24, 2022. The meeting started and ended with two workshops: on the first day there was the "High Entropy Alloys workshop" organized by Magdalena Wencka, dedicated to the 65th birthday of Prof. Janez Dolinšek (Jožef Stefan Institute, Ljubljana), while Katarzyna Gliszczyńska organized the workshop "Innovative Researcher: How to design a marketable best-seller PhD thesis" on November 24. During

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the main event there were very interesting 32 oral and 15 poster presentations, which stimulated fruitful discussions and further networking. During the conference dinner, two awards for both oral and poster presentations were announced. The award winners are presented below.

More details about the ECMetAC Days 2022 program can be found [here](#).

ECMetAC Young Scientists Poster Presentation Award: Büşra Mete

Max-Planck-Institut für Chemische Physik fester Stoffe (Dresden, Germany)

“Nb-Ni binary compounds in oxygen evolution reaction”



Büşra Mete is in her first year of PhD. The main topics of her studies are electrochemical behavior and performance of the Ni-based electrocatalysts especially for oxygen evolution reaction. She

emphasizes the importance of green hydrogen as an efficient energy carrier for upcoming years of energy crisis. The fascinating and motivating part of the studies is the potential applicability in industry after lab-scale development. Additionally, monitoring of the material changes via different modern techniques and combining those results with the electrochemical data allow to have an insight into properties of studied materials and contribute “puzzle piece” into future knowledge-based search of active and stable electrocatalysts. She believes working on catalysts in general has potential to be the gamechanger for many human-life important processes.

She enjoys spending her free time by doing yoga. `Yoga allows me to stop worrying about life for a second and do something really helps with my own good only.` - Büşra said.

ECMetAC Young Scientists Poster Presentation Award: Liam Chandler

The University of Liverpool SSRC (UK)

“Multiscale quasiperiodic metallic alloys and characterising their physical properties”

Liam Chandler works at the University of Liverpool in the Surface Science Research



Centre (SSRC) as a PhD student under Dr Hem Raj Sharma and Prof. Ronan McGrath. The SSRC has ultra-high vacuum (UHV) systems with surface-sensitive probing instruments for characterising surfaces. Liam’s

research so far covers two areas: Quasiperiodic tilings fabricated with nanolithography and their magnetic properties (on the poster presented), and investigating the properties of quasicrystal surfaces in UHV. The nanolithography project is in collaboration with Dr Liam O’Brien at the University of Liverpool, Prof. Ron Lifshitz at the University of Tel Aviv and Prof. Phillip Moriarty at the University of Nottingham. We are enthusiastic for a few reasons about fabricating quasiperiodic tilings with nanolithography: expanding a fresh look on multi-scale quasicrystal research, and from a magnetic thin film perspective we are interested in how short and long-range order is influenced by quasiperiodicity. In Liam’s spare time, he enjoys gaming with his friends in the French Toast Mafia.

ECMetAC Young Scientists Oral Presentation Award: Priyanka Reddy

Department of Physics, Faculty of Science,
University of Zagreb (Croatia)

*“Murunskite: a bridge between cuprates
and pnictides”*

I am Priyanka Reddy a 2nd year PhD student at the Faculty of Science, University of Zagreb. The main topic of my research, supervised by prof. Barišić and prof. Sunko, is the compound murunskite ($K_2FeCu_3S_4$). It is a new class of material that in many respects bridges the gap between the only two known high-temperature superconducting families, cuprates and iron-pnictides. Structurally, it is identical to iron-pnictides, with the iron site mostly replaced by copper, while the arsenic site (that corresponds to oxygen in cuprates) is replaced by sulfur. The first ever grown single crystals showed insulating behavior and exhibit antiferromagnetic ordering, like the parent compounds of cuprates. When S is substituted with Se and Te, the resistivity decreases significantly which is then taken as an indication of metallization. It is exactly this flexibility of ligand substitution that renders this system exciting for studying the relationship between bond polarity, orbital occupation, and functionality of new materials. We have characterized the obtained single crystals with great care by various experimental methods, which also helped me to develop various skills like sample preparation for PXRD, TEM and Laue as well as participate in measurements including optical conductivity and photoemission spectroscopy. In a further effort to metallize this compound and find potentially interesting parts of the phase diagram, we have begun to employ the ionic liquid gating method.

Among all of the various experimental tools that I had a possibility to see and work with, what I enjoyed the most was the trial-and-error method employed for the optimization of the synthesis process. From broken tubes to opening perfectly grown crystals, everting has kept me on my toes. And yes,

I spend a lot of my time in the lab working on my PhD topic, but this has not stopped me from exploring a myriad of hobbies. In my free time, I like to take up activities that might challenge my physical and mental capabilities, I love a good competition and participating in sports like Badminton is a lot of fun. But when I need to find my calm I practice yoga and occasionally visit the firing range, which also helps me to improve my marksmanship. I also believe in blasting music at full volume and dancing my heart out relieve stress! As an international student, the easiest way you can overcome the barriers of languages, regions etc is by finding like-minded people sharing the love for the same hobby.

ECMetAC Young Scientists Oral Presentation Award: Thiago Trevizam Dorini

Institut Jean Lamour, Université de Lorraine
– CNRS (Nancy, France)

“Complex ultrathin oxide structures revealed by evolutionary computations: $In_xO_y/PdIn(001)$ ”

Thiago Trevizam Dorini obtained his PhD at the Jean Lamour Institute under the supervision of



of Émilie Gaudry and in collaboration with Anton Kokalj from Jožef Stefan Institute. He uses mainly Density Functional Theory combined with different techniques (such as genetic algorithms, ab initio

molecular dynamics, and ab initio atomistic thermodynamics) to uncover the intrinsic interfacial properties of the metallic/oxide interface, particularly in the Sr-Ti-O/Pt(111) and $In_xO_y/PdIn(001)$ systems. In addition, he determines the stability of many different oxide phases under varying

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temperature and pressure conditions. His objective is to correlate all calculations with the experimentally found oxide structures on these systems and possibly predict new phases. He also developed a new programming tool, called "Vulcan", to automatize the pre- and post-processing of all calculations performed.

In his free time, he likes to do several hobbies and changes them constantly. Some of these hobbies are playing the acoustic guitar, playing video games, doing hikes, and cooking.

Workshop entitled: "Innovative Researcher: how to design a marketable best-seller PhD thesis"

by Dr. Magdalena Wencka

On the last day of the ECMetAC Days 2022 in Split (Nov. 24th), a workshop dedicated to our young researchers (but not only) for a general innovative skills training was conducted. The content of the workshop touched an issue of the commercialization of scientific efforts and was entitled "Innovative Researcher: how to design a marketable best-seller PhD thesis". Thinking about particular "person" (an end-user) to whom we dedicate our scientific work, we used the Design Thinking (DT) process that consists stages of empathizing, defining, ideating, prototyping and testing. According to the DT approach, to create an innovation we need to know our end-user and develop understanding of her/his situation, diagnose his/her needs, generate suitable ideas to solve particular problem, to make a suitable prototype and test it. Our workshop was guided by the DT facilitator and coach Katarzyna Gliszczyńska who is also a Senior Innovation Strategist and Dr. Magdalena Wencka (doctor of physics and innovation manager). As our coaches are experienced in a development of new ideas and new products (NPD) we invented new solutions

that reflect particular needs of our end-user who was one of us. During our workshop we also hosted on-line an expert who uses the DT protocol solving current issues at an academic level. Our special guest was Dr. Mikołaj Marcela from the University Silesia in Katowice (Poland) who published his PhD thesis as a best-seller.

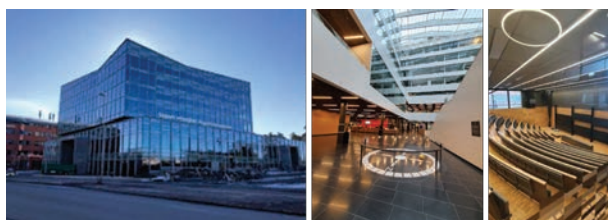


Freshly made prototype of a lamp that is an answer for our end-user need "to bring some nature to her home office" (on the left), a group of our participants together with our coach Katarzyna Gliszczyńska (the first person on the left, middle picture) and works on prototypes (on the right).

Upcoming Events

We list below some events that may be of interest to Network members:

ECMetAC EuroSchool 13th-18th August 2023, Uppsala, Sweden



The next Euroschool 2023 entitled "Synthesis and Characterisation" will be organized over 6 days in Uppsala by Prof. Cesar Pay Gómez and his team. This is the first time that an ECMetAC event will take place in Sweden. Experts in the field of material synthesis and characterisation will give lectures and organize tutorials. The Euroschool location selected is the newly built House 10 at the Ångström Laboratory in Uppsala.

<https://ecmetac.eu/>

The target audience of the event is Ph.D. students, doctorate fellows, and people new to the field of material science, chemistry and physics. The list of previous EuroSchool is accessible on our [website](#).

ICQ15th: 18th-23rd June 2023, Tel-Aviv University, Israel



The next International conference on quasicrystals will be organised by Prof. Ron Lifshitz at the Steinhardt Museum of natural History in Tel-Aviv, Israel.

ECMetAC is one of the sponsors of ICQ 15th. The last such event took place in 2019 in [Kranjska Gora](#), Slovenia.

Journées des Actinides 52 17th-21st April 2023, MPI CPFS Dresden, Germany



The Max Planck Institute for Chemical Physics of Solids is pleased to host the 14th School on the Physics and Chemistry of the Actinides (SPCA) and the 52nd Journées des Actinides (JdA) international conference. This event series provides an informal and interdisciplinary forum for the discussion of current advances on the physical and chemical properties of lanthanide- and actinide-based alloys and compounds. More [information on the website](#).

26th Congress and General assembly of the IUCr, 22nd-29th August 2023, Melbourne, Australia.

Many micro-symposia will be dedicated to quasicrystal, aperiodic crystals, approximant,



complex structure, disorder, and magnetic structures.

More information can be found [here](#)

CMD30, FisMat2023: 4th-8th September 2023, Milan Italy.



The 30th general conference of the Condensed Matter Division of the EPS will be held in Milan (Italy) on September 4-8, 2023, jointly organized with FisMat, the biennial conference of the Italian community of condensed matter physics, optics, liquids and soft matter.

Please visit the [website](#).

TMS2023 Annual meeting & Exhibition, San Diego, California, USA Symposium on [“Frontiers of Materials Award Symposium: Intermetallic Alloys at the Edge of Complexity: Structural and Kinetic Aspects”](#) during the meeting from 19th-23rd March 2023.

Missing Content?

If you have any news items for circulation, either on our website or in this newsletter, please send them to Julian Ledieu.

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Kasteelpark Arenberg 44
B-3001 Leuven (Belgium).