

German Mineralogical Society

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"HIGH-PRESSURE EXPERIMENTAL TECHNIQUES AND APPLICATIONS TO THE EARTH'S INTERIOR" REPORT ON THE 2025 SHORT COURSE AT BGI IN BAYREUTH



This year, the Bavarian Geoinstitute of Bayreuth (BGI) hosted the DMG Short Course on 'High-Pressure Experimental Techniques and Applications to the Earth Interior', which took place from February 17 to 21, 2025. The course welcomed 18 students, including PhD candidates and bachelors and masters students, coming from various parts of the world. United by their shared interest in deepening their knowledge of high-pressure experimental techniques, the participants were led by experts through a program that included both theoretical and practical sessions of the experimental and analytical methods used at the BGI.

Lectures covered the fundamental principles, presenting theoretical background and practical implications of different high-pressure experiments and analysis techniques. During the practical sessions, the participants could put their gained knowledge and practical skills to the test. Experiments focused on high-pressure applications, using a piston-cylinder apparatus as well as a multi-anvil press and diamond anvil cells. The participants were also able to carry out different rock deformation experiments and observe the influence of stress and strain. The divided small groups of students were well supervised and led through the experimental preparation, including the precise construction of metal capsules, samples, and cell assemblies, as well as the actual performance of the experiments. The diamond anvil cell experiments, in particular, left a lasting impression. Known for their ability to reach the highest pressures, they are the smallest apparatus, enabling in situ measurements and different heating methods like laser heating. In order to determine the pressure, tiny ruby crystals were placed on the diamond culet. Their pressure-dependent fluorescence was impressively demonstrated in the in situ observations.

The second half of the course covered various analytical methods typically used at BGI. The students were familiarized with different spectroscopic techniques, including Raman spectroscopy, X-ray diffraction, and Mössbauer spectroscopy. The latter enables highly sensitive measurements of iron despite its simple design. Other presented methods are scanning electron microscopy and transmission electron microscopy, which combine optical and chemical analysis advantageously, and laser ablation ICP-MS, a powerful tool for isotope and trace element measurements.

In addition to its academic commitment, BGI made every effort to warmly welcome students by organizing a dinner at Oskar, a popular restaurant where they had the chance to experience Bavarian and Franconian culinary traditions. During this event and the following days, students had the opportunity to engage in meaningful exchanges of ideas and experiences, gain new perspectives, and explore potential collaborations.

The short course provided an opportunity to explore high-pressure experimental petrology in greater depth, involving students from

diverse backgrounds and academic levels. This was made possible thanks to the dedication and availability of all the experts, who organized the activities in a comprehensive and engaging manner.

Our sincere gratitude goes to the short course organizers for giving the students the opportunity to explore the fascinating world of highpressure experimental petrology further!

> Isabelle Hartleib (Tübingen), Dorothea Engert (Kiel), Alessia Turini, and Filippo Salsini (Pisa, Italy)

DMG SECTION MEETING 2025

Applied Mineralogy and Crystallography

The sections for Applied Mineralogy and Crystallography of the German Mineralogical Society held their yearly workshop from the 26th to 28th of March 2025 in Bad Windsheim, Bavaria. A total of 27 participants from universities in Germany and Switzerland (Augsburg, Berlin, Bern, Bremen, Erlangen, Freiberg, Halle-Wittenberg, Jena, Karlsruhe, Koblenz, LMUMunich) and from German research institutes (Max Planck Institute for Coal Research, ITEL - German Lithium Institute, Helmholtz Centre for Materials and Energy HZB, Forschungsgemeinschaft Feuerfest e.V. [Research Association for Refractories], Fraunhofer Institute for Building Physics) attended the workshop, with 19 oral contributions covering a diverse range of topics including energy materials, circular economy, and building materials. A set of method-centred contributions additionally focused on the use of advanced experimental and computational methods in applied mineralogy and crystallography research. All contributions were followed by lively discussions that often continued during the coffee breaks and meals, fostering exchange between early-career scientists and more senior members of the community. As announced last year, the workshop was held in English for the first time, which led to the participation of several non-native speakers and was (presumably) responsible for a significant increase in attendance compared with 2024.



2025 Meeting of the Applied Mineralogy and Crystallography sections of the DMG. Group photo in front of Hotel Späth in Bad Windsheim, Germany.

The workshop was kicked off by an inspirational evening lecture by Frank Schilling (Karlsruhe), current DMG chairman, who not only highlighted the important role of applied mineralogy in energy research, but also emphasised the continued significance of mineralogy as a discipline in the view of current societal challenges. A plenary discussion on the second evening touched upon several matters of the sections, including the representation of applied mineralogy and crystallography topics at annual meetings of the German geoscientific societies (e.g., Geo4Göttingen 2025) and the establishment of closer links to related societies, especially in materials science and engineering (e.g., BV MatWerk). Strategies to make the events of the sections more accessible to undergraduate students were also discussed. For the coming year, it was agreed to organise the workshop in the established format in Bad Windsheim. The dates were already set to 11th to 13th of March 2026, so please mark your calendars accordingly!

Michael Fischer (Bremen)

ANNUAL DMG MEETING 2025 – DMG YOUNG SCIENTIST AWARD

At the annual meeting of the German Mineralogical Society (DMG) the **Young Scientist Award** is given for the best oral and poster presentations by a student. Student DMG members may apply when submitting an abstract for the 103rd annual DMG meeting in 2025, which will take place at the Geo4Göttingen Conference 2025 (www.geo4goettingen2025.de). The application form can be downloaded from https:// www.dmg-home.org/fileadmin/user_upload/Form-Nachwuchspreis_ v2025.pdf.



The German Mineral Society (DMG) is pleased to present last year's Young Scientist Award for an exceptional presentation at the emc²⁰²⁴ meeting in Dublin to **Max Hellers** from the University of Cologne.

His presentation on olivines from the Delitzsch Carbonate Complex in Saxony demonstrated how analyses of the major and trace elements of alnöite, an ultramafic lamprophyre, from drill cores using electron-probe microanalysis (EPMA)

and laser ablation mass spectrometry (LA-ICP-MS) can provide a deeper understanding of the multifaceted history of magma evolution. Olivine is used as an archive of geological processes, whose complex zonation reflects the multi-stage nature of magmatic evolution.

This work makes a significant contribution to the understanding of dynamic processes in the Earth's crust and upper mantle. The combination of different analytical methods opens up new perspectives for the study of geological evolution and the internal processes of our planet.

The abstract of the talk can be found here: https://www.minersoc.org/ wp-content/uploads/2024/09/EMC-Programme-and-Abstracts-FINAL. pdf.

BEATE MOCEK PRIZE

The Beate Mocek Prize of the DMG is intended to promote female scientists in an early stage of their career in the field of mineralogy, specifically in the areas of petrology and geochemistry. This award was created in memory of the geochemist and petrologist Beate Mocek by her family in 2013. Female undergraduate or PhD students who are also members of the DMG are eligible to apply. In 2025, three female young scientists were awarded.



Carina Silke Hanser has developed her childhood passion for minerals into an impressive scientific career. She began collecting rocks and minerals in the Black Forest at an early age, which ultimately led to a degree in geosciences at the University of Freiburg. Her in-depth education, supplemented by further gemological training at renowned institutions, led her to a doctorate at Johannes Gutenberg University Mainz, where she concentrated on the spectroscopic analysis of beryl. Her research has focused intensively on the

characterization of emeralds from the Chitral region, applying spectroscopic methods to investigate the structural and color-producing mechanisms of beryl. She has also been involved in materials science studies relevant to monument preservation and restoration. Her expertise extends to the diagnostics and analysis of historical materials, allowing her to work across disciplines such as mineralogy, geochemistry, and applied materials research. Her diverse research has been published in several peer-reviewed journals and has received international attention. With her commitment to international conferences and her tireless scientific curiosity, she makes a significant contribution to the advancement of mineralogy and gemology. The Beate Mocek Prize will enable her to further intensify professional exchange and increase the visibility of her innovative research.



Patricia Marks has established herself as an outstanding young scientist in experimental mineralogy. Her research focuses on H_2O degassing in hydrated silicate melts—a key process for explosive volcanic eruptions. She has extensive experience in high-pressure and high-temperature technologies as well as analytical methods, such as electron beam microprobe analysis, scanning electron microscopy, Karl Fischer titration, FTIR, and Raman spectroscopy. In her PhD project, Patricia Marks investigated the interac-

tions between mafic and felsic melts and the degassing behavior of the Lower Laacher See phonolite melt. Her experiments showed that bimodal interactions generate highly vesiculated zones that can accelerate magma ascension and intensify eruption explosivity, providing important insights into the mechanisms of explosive volcanic eruptions. She has presented her results at international conferences and published in renowned journals. She collaborates with research institutions such as the Bavarian Geoinstitute and Sapienza University of Rome, and is investigating the 2022 Hunga Tonga-Hunga Ha'apai eruption. She plans to use the Beate Mocek Prize to finance her participation in the International Volcanological Field School GEOS 424/624 in Alaska. This excursion will provide valuable insights into volcanic processes and strengthen her international research network. Patricia Marks' outstanding work contributes significantly to the understanding of explosive volcanic eruptions and makes her a worthy candidate for the Beate Mocek Prize.



Iris Arndt is a geochemist specializing in the application of innovative methods to reconstruct past environmental conditions. In her dissertation, she analyzes giant clams to draw precise conclusions about the paleoenvironment of the Late Miocene using geochemical isotope and element measurements. She uses the isotopic compositions of carbon, oxygen, and strontium, as well as the analysis of trace elements such as barium, magnesium, and sodium in clam shells. This approach enables her to reconstruct seasonal

temperature fluctuations of up to 4 °C—a value twice the present-day seasonal temperature fluctuations in the region. Her first dissertation publication, expected to be published in 2025, will provide significant ¹⁸O data that could serve as the basis for future studies of Late Miocene climate dynamics. Next, she plans to conduct dual-clumped isotope measurements on recent mussels to investigate seasonal changes between temperature and seawater ¹⁸O with even higher resolution. Her innovative project has the potential to significantly advance research in the field of paleoenvironmental reconstruction. Her commitment to promoting women in geosciences is particularly noteworthy. The Beate Mocek Prize would not only further support her research but also advance her scientific career by giving her the opportunity to share her innovative methods and research results with a wider audience.