German Mineralogical Society

www.dmg-home.org

ABRAHAM GOTTLOB WERNER MEDAL TO KAJ HOERNLE

Kaj Hoernle.
PHOTO: T. EISENKRÄTZER

The Abraham Gottlob Werner Medal of the German Mineralogical Society is presented in recognition of outstanding scientific merits. The 2024 medal is granted to Prof. Dr. Kaj Hoernle (GEOMAR).

Kaj Hoernle has established himself as a leading figure in geochemistry and petrology. His journey began with a Bachelor of Arts in Geology from Columbia University in New York, USA, where he graduated summa cum laude. After laying a strong academic foundation on the East Coast, Kaj moved to California to pursue a Master of Arts in Petrology at the University of California, Santa Barbara (UCSB), USA. His academic career culminated in a PhD at the University of California, Santa Cruz, USA, where he focused on geochemistry under the guidance of Charlie Langmuir. A research and teaching role at UCSB followed postdoctoral positions in Santa Barbara and Santa Cruz. Ultimately, Kaj transitioned to GEOMAR in Kiel, Germany, where he was appointed a professorship in petrology and geochemistry at the University of Kiel, in collaboration with the GEOMAR Helmholtz Centre for Ocean Research Kiel.

Since 1994, Kaj Hoernle has led the Geochemistry and Petrology Research Group at GEOMAR, which includes cutting-edge radiogenic isotope laboratories. His team is a crucial part of Research Division 4 at GEOMAR, focusing on the geodynamics of the ocean floor and undertaking global research initiatives. A significant aspect of Kaj's research is its international dimension, as evidenced by his numerous research expeditions and prestigious guest appointments at the University of South Carolina, USA in 2009–2010 and Macquarie University in Sydney, Australia, in 2014–2015. His work primarily revolves around the formation and evolution of magmatic rocks, with a special focus on the interaction between the Earth's lithosphere and hydrosphere. Over the years, his group has produced high-precision analyses of radiogenic isotopes and trace elements, particularly focusing on the elements Sr–Nd–Hf–Pb.

Kaj's scientific investigations are centered on magmatic rocks, especially those originating from the Earth's mantle. His research delves into the formation and evolution of high-temperature oceanic basalts at both convergent and divergent plate boundaries, as well as intraplate volcanics. His extensive field of study has taken him to all corners of the globe, where he has conducted research across the world's oceans. Over his career, Kaj has organized and led numerous research expeditions as Chief or Co-Chief Scientist, exploring the ocean floor and collecting invaluable samples. The scientific value of these ocean floor samples is expected to be a foundation for future research for decades to come.

His contributions are particularly noteworthy in studies on the Messinian salinity crisis, the Hikurangi Plateau in the Pacific Ocean, and research on the Galapagos and Canary Islands. Additionally, his work on the upper mantle beneath Central America, the central Atlantic, and Europe has significantly advanced our understanding of mantle dynamics and large-scale tectonic processes. His studies also highlight the complex interactions between plate dynamics and deep mantle processes, utilizing radiogenic isotopes as magmatic tracers and high-precision Ar-Ar dating techniques for island chains and oceanic plateaus.

Another hallmark of Kaj's career is his dedication to mentoring young scientists. He has supervised and guided more than 60 early-career researchers, both onshore and at sea, contributing to the growth of the next generation of leaders in the field. His work is distinguished by its interdisciplinary nature, connecting magmatic geochemistry with mantle dynamics, ore deposit studies, climate science, and even biology. These interdisciplinary connections are a recurring theme in his research and underscore the broad impact of his work.

This year, the DMG honors Kaj Hoernle as an outstanding scientist whose extensive contributions to international research, teaching, and service to the scientific community are unparalleled. His groundbreaking work in geochemistry transcends disciplinary boundaries and will undoubtedly shape the future of marine geosciences for generations to come.

Oliver Nebel (Clayton, Victoria, Australia)

VICTOR MORITZ GOLDSCHMIDT PRIZE 2024 TO TIMO HOPP

Timo Hopp

Timo Hopp studied geosciences at the University of Münster, Germany, where he completed his doctoral thesis at the Institute of Planetology in 2018. He then was postdoctoral researcher at the Department of Geophysical Sciences at the University of Chicago, USA, and has been a scientist and laboratory manager in the Department of Planetary Sciences at the Max Planck Institute for Solar System Research in Göttingen, Germany since June 2022.

Timo Hopp is a cosmochemist who uses high-precision isotope measurements to study the earliest history of the Solar System and planets. His work is characterized by the application of state-of-the-art analytical methods, which he has either developed from scratch or modified in such a way that the improved precision has led to significant new insights. Timo's work has provided fundamental new insights into the formation of the first planetary bodies in the Solar System and the origin of the Earth.

During his doctorate, Timo developed the mass-dependent isotope fractionation of ruthenium (Ru) as a new tool for investigating the differentiation history of protoplanets and the origin of the so-called "late veneer" on Earth. Timo was able to show that the mass-dependent isotope fractionation of Ru changes systematically with the degree of chemical differentiation of the planets, so that the individual stages of the formation, segregation, and crystallization of metallic melts during core formation can be reconstructed using Ru isotopes. In a follow-up study, Timo was able to show that, in contrast to the variable isotope fractionations observed among differentiated meteorites, the Ru in the silicate Earth is not isotopically fractionated, but has the same isotope composition as the undifferentiated chondritic meteorites. Because virtually all the Ru in the silicate Earth is from the late veneer (the last ~0.5% of the Earth's mass added after the completion of core formation), this observation shows that the late veneer probably consisted of chondritic bodies and not, as is sometimes assumed, of parts of chemically fractionated objects.

Timo's other main area of research utilizes nucleosynthetic isotope anomalies, which arise from the heterogeneous distribution of isotopically extremely anomalous presolar components in the solar accretion disk. These anomalies are particularly well suited for identifying genetic relationships among different planetary materials and thus, for instance, for reconstructing the origin of Earth's building material. For example, using isotope anomalies in ruthenium and molybdenum, Timo was able to show that the late stages of Earth's accretion included a heterogeneous mixture of material from the inner and outer Solar

System. Using iron isotope anomalies, he was able to show that the Earth consists mainly of material from the inner Solar System and has accreted only very little material from the outer Solar System. This finding contradicts the predictions of some recent planet formation models, in which the terrestrial planets gained a large part of their mass through the accretion of cm-sized "pebbles" from the outer Solar System. Rather, Timo's results support the predictions of the classical model of planet formation, in which the terrestrial planets formed through collisions of Moon- to Mars-sized bodies from the inner Solar System.

In another groundbreaking study, Timo analyzed samples from asteroid Ryugu, from which the *Hayabusa2* mission of Japan's space agency JAXA returned 5.4 grams of material to Earth. He showed that the iron isotope composition of Ryugu is identical to that of the Ivuna-type carbonaceous chondrites (the CI chondrites), but different from all other carbonaceous chondrites. This discovery has far-reaching implications, as it shows that the CI chondrites formed in a different area of the solar accretion disk than the other carbonaceous chondrites. Because the latter presumably formed directly outside the orbit of Jupiter, it is reasonable to assume that the CI chondrites and Ryugu originally formed even further out, possibly in the vicinity of Uranus and Neptune. This means that CI chondrites/Ryugu and comets could originally consist of the same material, a prediction that could be tested by a future "sample return" mission to a comet.

Although most of Timo's work is in the field of cosmochemistry, his interests are much broader. In 2020, by using isotope measurements on residues from air filters of the International Atomic Energy Agency, Timo was able to determine the origin of an undeclared release of radioactive Ru that happened in 2017. The assumption was that this Ru came from an accident in a Russian reprocessing plant. However, it was also possible that the released Ru came from the production of weapon-grade plutonium. By measuring the isotopic composition of a few nanograms of Ru from air filters before, during, and after the release of the radioactive Ru, Timo was able to identify a Russian reprocessing plant as the source. This is obviously a result of great public interest and political relevance and it was the first time that Ru isotopes were used as a tool in nuclear forensics.

With the Victor Moritz Goldschmidt Prize for Timo Hopp, the German Mineralogical Society honors an extremely innovative, creative, and productive scientist whose work is characterized by an impressive breadth of expertise and has led to new key insights in various fields of research.

Thorsten Kleine (Göttingen)

DMG SHORT COURSES 2024/25

As before, DMG will support several short courses in fall/winter 2024/25. All courses will be aimed primarily at advanced-level undergraduate and graduate students but, as always, are open to more senior researchers as well. Nonlocal student members of DMG will be eligible for travel support to the amount of € 100. Further information can be found at www.dmg-home.org/aktuelles/doktorandenkurse/.

(5-24) **Application of Diffusion Studies to the Determination of Timescales in Geochemistry and Petrology**, Institute for Geology, Mineralogy and Geophysics, Ruhr University Bochum, Sumit Chakraborty, Ralf Dohmen, 21–25 Oct. 2024, (sumit.chakraborty@rub.de)

(7-24) **19th Freiberg Short Course in Economic Geology – Critical Raw Materials: A Global Perspective**, Helmholtz Institute Freiberg for Resource Technology, 9–13 Dec. 2024 (www.hzdr.de/eg_shortcourse)

(1-25) **High-Pressure Experimental Techniques and Applications to the Earth's Interior**, Bayerisches Geoinstitut/University of Bayreuth, Florian Heidelbach, TBA Feb. 2025 (florian.heidelbach@uni-bayreuth.de, www.bgi.uni-bayreuth.de/?page=7&view=shc)

(2-25) **FIERCE Isotope Short Course 2025**, FIERCE – the Frankfurt Isotope and Element Research Center, Institute for Geosciences, Goethe University Frankfurt, 11–14 March 2025 (www.fierce.uni-frankfurt.de/FIERCE_Isotope_Short_Course)

(3-25) **Introduction to Secondary Ion Mass Spectrometry in the Earth Sciences**, Helmholtz-Centre Potsdam – GFZ-Deutsches GeoForschungsZentrum, Michael Wiedenbeck, TBA spring 2025

19. Freiberg Short Course in Economic Geology
Critical Raw Materials: A Global Perspective

9–13 December 2024

Prof. Judith Kinnaird and Prof. Paul Nex
(University of Witwatersrand, South Africa)

Helmholtz-Institut Freiberg for Resource Technology, Germany

Registration by 11 Nov. 2024. First come first serve!
www.hzdr.de/eg_shortcourse

The transition to a low-carbon future is likely to be mineral intensive because clean energy low-carbon technologies, particularly solar photovoltaic (PV), wind, and geothermal energy production, are currently more mineral intensive relative to fossil fuel production. Greater ambition on climate change goals, as outlined by the Paris Agreement, requires installing more of these technologies and will therefore lead to a larger material footprint. Recent proposed EU legislation "The Critical Raw Materials Act (CRMA)" requires that >10% of the EU's annual consumption should be extracted in Europe, >40% of the EU's annual consumption should be processed in Europe, <65% of the EU's annual consumption of each critical raw material should not come from a country outside of the EU, and >25% of the EU's annual consumption must be recycled so as to create a circular economy. Currently, we are far from achieving the circular economy that is needed for sustainable development.

This course aims to provide a better understanding of the deposits with which critical raw materials are related, examples of where and why enrichment has occurred, and the implications of restricted and uncertain supply.

The course consists of lecture units on introductory topics such as "Towards a Greener Economy" and "Critical Raw Materials Now and for the Future." The main part focuses on deposit types containing critical raw materials (e.g., REE, Nb, Ta, Co, Va, Li, bauxite, graphite). At the end of each topic block, there is time for discussion.

Fees: Students (Bsc, MSc): 110 Euro. PhD candidates, postdocs, senior researchers: 320 Euro. Industry representatives: 500 Euro

DMG and **SGA** sponsor this course, for more information: www.hzdr.de/eg_shortcourse

Organisers: Jens Gutzmer, Richard Gloaguen, Sandra Birtel, Manuela Wagner, contacthif@hzdr.de