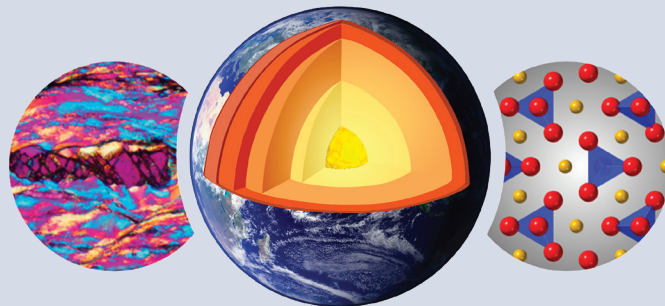


ABOUT THIS ISSUE

Understanding the physical and transport properties of minerals is essential for deciphering geophysical and planetary processes. Building on Haüy’s early recognition of the link between crystal structure and macroscopic behavior, modern spectroscopic, thermal, mechanical, electrical, and magnetic techniques now probe these properties across all scales—from atoms to planets. This issue of *Elements* explores how minerals respond to external fields,

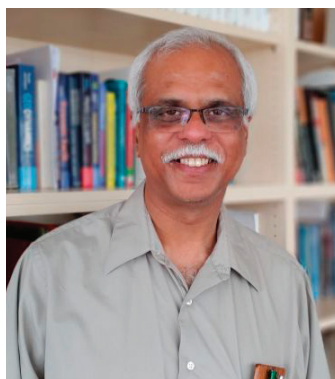


(LEFT) Cataclastically deformed garnet surrounded by recrystallized quartz. IMAGE CREDIT: CLAUDIA TREPMMAN. (RIGHT) Crystal structure of olivine.

revealing clues about their past and the dynamic processes shaping Earth and other planetary bodies. It presents key concepts in mineral physics alongside recent technological advances that enhance our ability to study planetary interiors. Through selected research areas, the volume illustrates how this knowledge deepens our understanding of planetary evolution and highlights the major scientific challenges that lie ahead.

THANK YOU, SUMIT CHAKRABORTY

This fascinating thematic issue of *Elements* marks the sixth and final issue published under the leadership of Principal Editor of Mineralogy, Professor Sumit Chakraborty (Ruhr Universität Bochum, Germany). It has been both an honor and a pleasure to have Sumit serve on the *Elements* Editorial Board. His knowledge, insight, kindhearted dedication, and fine-tuned attention to detail have strengthened the magazine’s standards for excellence in ways that will continue to positively influence the publication for years to come. In addition to his service as Principal Editor, Sumit also played a key role in *Elements*’ 20th anniversary commemoration at Goldschmidt 2025 in Prague, Czech Republic, where he organized and chaired the Special Session, “*Elements* at 20 Years: Past Successes and Future Directions,” which included a Town Hall that facilitated forward-looking discussions on the future of the publication.



Since joining the Board in 2023, Sumit has overseen the publication of “**Extraterrestrial Organic Matter**” (February 2024, vol. 20, no. 1), “**The Invisible Ocean: Hydrogen in the Deep Earth**” (August 2024, vol. 20, no. 4), “**Birth and Growth of Minerals from Aqueous Solutions**” (February 2025, vol. 21, no. 1), “**Sample Return Through the Ages**” (October 2025, vol. 21, no. 5), “**Earth’s Carbon Thermostat: Beyond the Textbook Model**” (February 2026, vol. 22, no. 1), and the present issue “**Mineral Physics Applied to Earth and Planetary Sciences**” (April 2026, vol. 22, no. 2). These elegantly curated collections of review papers on fundamental topics in the geosciences will continue to serve and support students, researchers, educators, and policymakers as educational resources for generations to come. Please join us in thanking Sumit—as well as the more than 100 authors and editors he has coordinated—for this tremendous contribution to the geoscience literature and community. We wish Sumit all the very best in his future endeavors, both personal and professional, and look forward to seeing his name again soon in the pages of *Elements*.

Tom Sisson, Carol Frost, Penny King, and Esther Posner



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there were seasonal variations, and most importantly—the carbonate was forming where the bedrock was limestone, but not where it was shale. It was in the context of these geological observations and spatial and lithological context of the chemical reactions that he could come up with the idea of reversibility of chemical reactions.

One could continue with the list of studies of natural materials that have yielded fundamental advances in physics and chemistry. In all of these cases, it is the study of those materials with an awareness of the current state-of-the-art in physics and chemistry that led to the important breakthroughs. This issue of *Elements* deals with the applications of principles of physics to study minerals and inform us about geological

processes. This is a topic that has become a major field of research in mineral sciences, but it is not taught as such in typical undergraduate Earth science curricula. The chapters in this issue attempt to convey some of the exciting developments in the field through the lens of five of the classical branches of physics—mechanics, heat, light, electricity, and magnetism. The hope is that it will attract more scientists to the interface of physics and minerals, point them toward the state of the art, and encourage them to transcend traditional disciplinary boundaries in general.

Sumit Chakraborty
Principal Editor