Special Issue

Serpentinization Processes and Their Kinetic, Metallogenic, and Environmental Effects

Message from the Guest Editors

Subduction zones play a pivotal role in global geodynamics and the cycling of volatiles (e.g., water, carbon dioxide, and methane). Within these zones, serpentinization—a process driven by the interaction of hydrothermal fluids with ultramafic rocks—acts as a critical bridge between mineral reactions, volatile recycling, and the formation of metal-rich deposits. During serpentinization, the hydration of olivine and pyroxene in mantle-derived rocks releases reducing volatiles such as hydrogen (H2) and methane (CH4). These fluids not only influence subduction zone dynamics by modulating slab buoyancy and seismicity but also contribute to the deep Earth carbon cycle and the potential emergence of life, as evidenced by their role in sustaining microbial ecosystems at hydrothermal vents. The mineral reactions central to serpentinization simultaneously liberate metallic elements, including nickel (Ni), cobalt (Co), chromium (Cr), and platinum group elements (PGEs), which act as catalysts for abiotic CH4 synthesis. This interplay between fluid–rock interactions and metal mobility underpins the genesis of diverse ore deposits.

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Message from the Editor-in-Chief

Minerals welcomes submissions that report basic and applied research in mineralogy. Research areas of traditional interest are mineral deposits, mining, mineral processing and environmental mineralogy. The journal footprint also includes novel uses of elemental and isotopic analyses of minerals for petrology, geochronology and thermochronology, thermobarometry, ore genesis and sedimentary provenance. Contributions are encouraged in emerging research areas such as applications of quantitative mineralogy to the oil and gas, manufacturing, forensic science, climate change, geohazard and health sectors.

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