

Research interests

My primary research interest is to understand the carbon cycle in the deep Earth from its elemental form, graphite or diamond, to its oxidized form, carbonate either solid or melt, with implications for the release of CO₂ to the atmosphere over the geological timescale. My research is based on laboratory experiments capable to reproduce geochemical and petrological processes occurring in the interior of the Earth at representative temperatures and pressures. To pursue the aims of my research, I use mostly mixture of chemicals, such as oxides, hydroxides and carbonates as starting materials for syntheses at ambient pressure-high temperature using furnaces also at controlled atmosphere or I use high-pressure devices, such as piston cylinder and multi-anvil presses. High-pressure techniques, such as piston cylinder, multi-anvil and diamond anvil cell are also used combined with in situ synchrotron radiation to achieve pressure and temperature conditions corresponding to those of the Earth's upper and lower mantle.

Such experimental approach linked to the knowledge we have of natural geological systems can improve our understanding of volcanic processes at the surface and the geodynamic evolution of our planet in terms of phase equilibria, magma segregation and volatile extraction over time.