



Chemistry at extreme conditions: Approaching the Earth's major interface

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Core-mantle boundary (CMB) is one of the most inaccessible and enigmatic regions on the Earth. Clearly distinct chemical nature of the mantle (dominated by silicates and oxides) and the outer core (liquid iron-nickel alloy) suggests a possibility of multiple and complex chemical reactions at CMB. Due to limitations of the diamond anvil cell (DAC) technique (small sample size, pressure and temperature gradients, potential contamination by carbon, risk of loss of materials on recovery, etc.), the study of chemical reactions at extreme conditions of CMB is a difficult task. Combination of different modern analytical techniques (synchrotron based X-ray powder diffraction, Mössbauer and Raman spectroscopy, SEM, ATEM, etc.) allows the elucidation of major trends in the behavior of the geophysically and geochemically important metal-oxide (Fe-SiO₂, Fe-Al₂O₃, MgO-FeO, Fe-MgSiO₃, for example) systems at pressures and temperatures of the Earth's deep interior. Methodological aspects of investigation of chemical reactions in DACs are also considered.