

EARTH & PLANETARY SCIENCE

A number of studies related to Earth and Planetary Science have been successfully conducted at different beamlines at SPring-8, using various techniques combined with the brilliant photon sources. These include high pressure mineral physics using both large-volume multianvil devices and diamond anvil cells (DAC), crystal structure analyses of minute synthetic and natural minerals, X-ray spectroscopic chemical analyses, etc. Here, two studies on phase transitions under very high pressures using DAC are reported using different light sources in the IR and undulator beamlines. The former (Shinoda *et al.*) study found a new phase transition in $\text{Mg}(\text{OH})_2$ accompanied by a change in the proton state in its crystal structure, while the latter (Ono *et al.*) first demonstrated the tetragonal-orthorhombic phase transition in SiO_2 at high pressure and high temperature. These successful results are indeed due to highly brilliant and small beams available at SPring-8, as the sample volume in DAC is extremely limited. Another interesting result is reported by Tsuchiyama *et al.*, who applied an X-ray CT technique to tiny chondrules (spherical inclusions present in some meteorites) and first revealed their three dimensional shapes without destroying the surrounding host material. They discuss the dynamic aspects of the chondrules when they were crystallized from liquid droplets and also speculate on the environments where they originated, on the basis of analyses of the observed shapes. Thus the various techniques combined with the third-generation photon source expand the frontiers of new research in Earth and Planetary Science at SPring-8.

