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Integration of structure, x-ray radiography, elastic wave velocity, and viscosity measurement in the Paris-Edinburgh Cell YOSHIO KONO, CHANGYONG PARK, CURTIS KENNEY-BENSON, GUOYIN SHEN, HPCAT, Geophysical Laboratory, Carnegie Institution of Washington, YANBIN WANG, GSECARS, the University of Chicago — We have integrated a range of techniques for physical property measurement with the energy-dispersive x-ray diffraction (EDXD) technique at the 16BM-B, a white x-ray beamline at the Advanced Photon Source, to promote comprehensive studies of structure-property correlations of liquid and amorphous materials at high-pressure. These include white x-ray radiography, ultrasonic velocity, and falling sphere viscometry techniques. The integration is centered on a Paris-Edinburgh cell to fully utilize the multi-angle EDXD capability with the wide open access. The integrated techniques are particularly useful to study liquid and amorphous materials, for which the integrated facility allows making simultaneous observations of macroscopic phenomena as the direct manifestation of the microscopic structure. The Paris-Edinburgh press enables us to compress large volume samples up to 2 mm in both diameter and length up to $\sim$7 GPa and 2300 K. The resolution of white x-ray radiography is $\sim$4 μm. The ultrasonic wave velocity measurement can be made for liquid materials as well as amorphous solids. The falling sphere viscometry technique have been developed using high-speed x-ray camera (>1000 frame/second), enabling us to investigate viscosity of not only high viscosity melts such as silicates but also low viscosity (<1 mPa s) liquids such as liquid metals and salts.

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