

Diamond-anvil cell High-pressure Research  
at Beamline-5A at Pohang Accelerator Laboratory

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High-pressure minerals and materials research program using diamond-anvil cells has been established as one of the major operating modes at the new multi-purpose wiggler beamline-5A (HFMS: High Flux Material Science) at Pohang Accelerator Laboratory (PAL). The optics of Beamline-5A satisfies conducting diamond-anvil cell research delivering fairly good amount of flux even at 18 keV from 14 multipole wiggler, and mirrors and sagittally focusing monochromator are used to improve spatial resolution of the beam to 200 micron in size. In the experimental hutch, diamond-anvil cell is mounted on the multi-axes sample stage of the 6+2 circle kappa diffractometer and a Mar345 imaging plate detector equipped with a PIN-diode beamstop for sample-to-beam alignment is used for diffraction measurement in 2D mode. An offline laser ruby-fluorescence pressure calibration system has also been installed in a remote lab along with other sample preparation equipments for diamond-anvil cell works. Among other types, a modified piston-cylinder cell with 100 degree conical opening is preferably used for the measurements in the medium pressure range (up to 10 GPa). Test measurements show comparable time and signal resolution to other high-pressure imaging plate beamlines in the US. Future developments will include resolution-selective measurements using high-resolution (crystal analyzer and scintillation) detector or linear position-sensitive gas detector depending on the angular (or energy) resolutions required. Some of the preliminary results on pressure-induced elastic behaviors and chemical evolutions of synthetic zeolites will be discussed.

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