

Developing high-pressure neutron diffraction techniques for a pulsed neutron facility

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Our research project, Creative Scientific Research for Ultra High Pressure Neutron Scattering, initiated from FY2007 aims to develop new experimental techniques for neutron diffraction measurements at a pulsed neutron source facility. The most important mission in our project is to apply nano-polycrystalline diamond (NPD) into a high-pressure cell which will achieve pressures higher than 30 GPa. For developing a new type of cell, we established a laser-beam micromachining technique for super-hard NPD. By applying the technique, we can fabricate a truncated shape of NPD for a Drickmer-type high-pressure apparatus. Application of NPD for a new type of diamond anvil cell for neutron scattering measurements is also under development. Neutron-focusing guides dedicated to high-pressure experiments are developed and a new guide has just arrived. The application of the guide mirror will significantly improve neutron scattering signals from a small sample target under pressure. In addition to the opposed anvil high-pressure devices, multi-anvil high-pressure device (palm cubic) is also developed in the project. Our ongoing research results will be reviewed.