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Development of high pressure cell for neutron diffraction experiment

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In PLANET, which is now under construction in J-PARC, 6-axis high pressure apparatus will be installed to conduct high pressure neutron diffraction experiment. Paris-Edinburgh press and Palm cubic press are also available, which have a capability to reach low temperature. High pressure generation is significantly affected by the material and design of gasket and cell. We are developing cell to generate high pressure using these presses and the result of test experiment will be presented.

1. Paris-Edinburgh (PE) press

PE press is widely used in neutron facility since it has a wide window. We have succeeded to generation to 6.6 GPa at 60 ton using single toroid WC anvils, and to 14.4 GPa at 130 ton using double toroid sintered diamond anvils.

2. Sintered Diamond (SD) Anvil for 6-8 type multi anvil press

To use 6-8 type cell for neutron diffraction, absorption by anvil is a problem since neutron diffraction requires wide window. SiC-binder SD has a potential for generate high pressure if it is used as anvil material for 6-8 type anvil press, and it absorbs less neutron compared to Co-binder SD. We conduct test experiment at ARNE7, in KEK, Tsukuba. High pressure was generated using multi anvil apparatus (MAX-III), using SD cube with 9.5mm on edge and TEL of 1.5 mm. The result shows that it can reach over 30 GPa at 300 ton, suggesting the ability for pressure generation. Future development of cell for large volume sample cell and high temperature is necessary.