

High pressure and high temperature generation using a 6-8-2type cell

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A 6-8-2type cell has been developed for high pressure generation using a multi anvil apparatus. This cell combines the concept of 6-8type (Kawai-type) multi anvil apparatus and diamond anvil cell, and adopts a pair of single crystal diamond for pressure intensifier in the pressure medium of multi anvil apparatus. Tests of pressure generation at room temperature based on some pressure standard materials (ZnS, GaAs and GaP) have made using tungsten carbide anvils with truncated edge length (TEL) = 3.0 mm.

In situ X-ray diffraction experiments were also conducted at SPring-8, using a Kawai-type multi anvil apparatus (SPEED-1500), at BL04B1. The generated pressure was calculated from the unit cell volume of Au using the equation of state of Au proposed by Anderson et al. (1989). As a result, pressure generation of over 50 GPa has been achieved by using the present cell at room temperature.

High pressure and high temperature (~1000 deg.C) experiment was carried out in a Kawai-type multi anvil apparatus at the Ehime university using the 6-8-2 type cell, using pyrope glass stating material. Back scattered electron images of the recovered sample demonstrated that it was composed of fine grained (~0.001mm) single-phase crystals. X-ray diffraction pattern of the recovered sample showed that the sample was converted to the perovskite structure with a small amount of corundum. The pressure produced at 1000 deg.C by the present cell is estimated to be about 36 GPa, which is substantially higher than that (~22 GPa) expected in a conventional 6-8 cell, using tungsten carbide anvils with TEL = 3.0 mm.