

6-8-2 type multi-anvil apparatus

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The maximum pressure achieved by Kawai-type multi-anvil apparatus(KMA)is limited to 30 GPa when tungsten carbide (WC) is used for the second stage anvil material. The use of Sintered diamond (SD) can expand the pressure limit up to 50 GPa.

The 6-8-2 system has been developed for high pressure generation using KMA. This system is based on the concept of KMA and diamond anvil cell (DAC). A pair of diamonds is selected for the pressure intensifier which is placed in the pressure medium of KMA. The kind of diamonds used for our experiments are single crystal diamond (SCD:Ib), SD and highly incompressible and mechanically durable diamond (HIME-DIA).

The pressure calibration was carried out at room temperature using pressure standard materials (ZnS, GaAs and GaP) and WC anvils with the truncated edge length (TEL) of 3.0 mm. In situ X-ray diffraction experiments were conducted at SPring-8, using the 6-8-2 system and a KMA (DIA-type press) at BL04B1.

The generated pressures were calculated from the unit cell volume of gold on the basis of the equation of state (EOS) proposed by Anderson et al. (1989). As a result, the pressure generation of over 90 GPa has been achieved with the load of ~7 mega Newton (MN) using the 6-8-2 system at room temperature.