

A miniature cubic anvil apparatus for optical measurement on deep earth minerals under high pressure

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A miniature cubic anvil apparatus was developed for optical measurement on deep earth minerals with relatively large volume under high pressure, and preliminary experiments were conducted to 3.6 GPa at room temperature with optical visual observation and ruby fluorescence measurement. In the apparatus, a cubic pressure medium was squeezed with six tungsten carbide anvils, which are driven with a pair of guide blocks by tightening four sets of screws. Optical access on the sample was made through holes in axial anvils and the guide blocks as well as optical windows made of Al₂O₃ single crystals embedded in the pressure medium. The apparatus is compact and light, ~53 mm in diameter and height and ~530 g in weight, and the features of the apparatus benefits easy application of the apparatus to various types of standard optical measurement systems. The optical measurement on the sample with relatively large volume should greatly contribute to advancements of studies relevant to high-pressure behaviors of deep earth minerals.

Keywords: cubic anvil apparatus, optical measurement, deep earth mineral, high pressure, optical visual observation, ruby fluorescence measurement