

Characterization of a high-pressure phase of silica from the Martian meteorite Shergotty

PRZEMYSŁAW DERA,* CHARLES T. PREWITT, NABIL Z. BOCTOR, AND RUSSELL J. HEMLEY

Geophysical Laboratory and Center for High Pressure Research, Carnegie Institution of Washington, 5251 Broad Branch Road, N.W.,
Washington, D.C. 20015, U.S.A.

ABSTRACT

Recently, there has been substantial interest in post-stishovite high-pressure polymorphs of SiO₂, discovered as extraterrestrial minerals, or synthesized in the laboratory. Previous investigators reported the presence of “ α -PbO₂-like” and “baddeleyite-like” SiO₂ in the Martian meteorite Shergotty, and also the synthesis of an α -PbO₂-like phase at pressures of 60–80 GPa in a laser-heated diamond anvil cell. To provide definitive information about the nature of the natural “ α -PbO₂ phase,” we recovered a small sample from the Shergotty meteorite, obtained powder X-ray diffraction patterns, and performed a Rietveld refinement of the structure. The resulting cell parameters and space group are $a = 4.097(1)$ Å, $b = 5.0462(9)$ Å, $c = 4.4946(8)$ Å, and *Pbcn*. The structure refinement confirms that this sample does have the α -PbO₂ structure.