P-V-T equation of state of SiC-3C: implications for primary pressure scale KIRILL ZHURAVLEV, University of Chicago, ALEXANDER F. GONCHAROV, Carnegie Institution for Science, SERGEY TKACHEV, PRZEMYSLAW DERA1, VITALI PRAKAPENKA, University of Chicago, GEOPHYSICAL LABORATORY, CARNEGIE INSTITUTION FOR SCIENCE COLLABORATION — We present a new primary pressure scale based on concomitant measurements of the density and elastic parameters of the single crystal samples of cubic silicon carbide (3C-SiC) under quasi-hydrostatic pressures up to 65 GPa and 773 K. The established pressure scale has precision of 2%-4% up to 65 GPa and will allow more accurate pressure determination in that range than the previously used pressure scales. We also report x-ray diffraction data and Raman spectroscopy on 3C-SiC up to 75 GPa. We determined the P-V-T equation of state (EOS) of 3C-SiC and pressure and temperature dependencies of the zone-center phonons, elastic tensor, and mode Gruneisen parameters. Cubic SiC lattice was found to be stable up to 75 GPa, but there is a tendency for destabilization above 40 GPa, based on softening of a transverse sound velocity. We proposed corrections to the existing ruby and neon pressure scales, and also calibrated cubic SiC as an optical pressure marker using Raman spectroscopy.

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