Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Equation of state of palladium hydride and deuteride to 100 GPa[1]

KEENAN BROWNSBERGER, Whitworth University, MUHTAR AHART, MADDURY SOMAYAZULU, STEPHEN GRAMSCH, RUSSELL HEMLEY, Carnegie Institution of Washington — To study the behavior of palladium hydrides under pressure, we loaded palladium foils in hydrogen or deuterium environments in two separate diamond anvil cells. We subsequently measured x-ray diffraction up to 100 GPa at room temperature. No structural phase transition was observed for either PdD_x or PdH_x between 0 GPa and 100 GPa. The pressure-volume data were fitted with the third-order Birch-Murnaghan equation of state, which gave an initial volume of 10.8 cm^3/mol, a bulk modulus of 153 GPa, and its derivative of 4.3 for palladium hydride. An initial volume of 10.6 cm^3/mol, a bulk modulus of 162 GPa, and its pressure derivative of 4.6 were determined for palladium deuteride. From initial volumes, we conclude that x=1 for both PdD_x and PdH_x. This work is supported by the Carnegie-DOE Alliance Center.

[1]EOS of palladium hydride and deuteride to 100 GPa

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Date submitted: 06 Nov 2015 Electronic form version 1.4