

The 501st Geodynamics Seminar

Combined in situ X-ray diffraction and electrical resistance measurements of pressure-induced phase transition and metallization in ZnTe, ZnS, GaAs, and GaP

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Pressures of pressure-induced phase transitions and metallization in ZnTe, ZnS, GaAs, and GaP were determined by electrical resistance and in situ X-ray diffraction measurement using a Kawai-type multi-anvil apparatus. Pressures were determined from the unit cell volumes of Au, MgO, and NaCl with corresponding equations of state (EOS). The determined metallization pressures based on Tsuchiya's EOS for Au were 24.7 GPa for GaP, 17.8 GPa for GaAs, 14.7 GPa for ZnS, and 11.0 GPa for ZnTe. Phase transitions in ZnTe, ZnS, GaAs, and GaP were observed from a zincblende structure to several high-pressure phases based on X-ray diffraction measurement. The bulk modulus of zincblende structure of these semiconductors were calculated to be $K_0 = 49$ (1) GPa for ZnTe, 81 (1) GPa for ZnS, 87 (2) GPa for GaAs, and 112 (5) GPa for GaP.

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