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Pressure-induced Transformations of Dense Carbonyl Sulfide to Singly Bonded Amorphous Metallic Solid[1] MINSEOB KIM, Washington State Univ, RANGA DIAS, Washington State University, YASUO OHISHI, Japan Synchrotron Radiation Research Institute, TAKAHIRO MATSUOKA, Gifu University, JING-YIN CHEN, CHOONG-SHIK YOO, Washington State University — The application of internal or external pressure transforms molecular solids into non-molecular extended solids with diverse crystal structures and electronic transport properties. Here, we present pressure-induced phase transitions and associated structural and electric transitions of carbonyl sulfide (OCS) using Raman spectroscopy, X-ray diffraction, resistivity measurement and pair distribution function (PDF) analysis. Linear molcular OCS(R3m, Phase I) transforms to bent OCS (Cm, Phase II) at 9 GPa, an amorphous, one-dimensional (1D) polymer at 20 GPa (Phase III), and an extended 3D network above 35 GPa (Phase IV) that metallizes at 105 GPa. Series of phase transformations reveal that long-range dipole interaction plays an important role in the transition regime of dense molecular solid and intermediate nature of OCS between its two isovalent end members of CO_2 and CS_2 leads to an important chemical concept for the extended molecular alloy.

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