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**Matter under Extreme Conditions: Advances Based on Static Compression**[1]

RUSSELL HEMLEY, Geophysical Laboratory, Carnegie Institution of Washington

Current technological advances make it possible to perform experiments on materials at static or sustained conditions to multimegabar pressures (several hundred GPa) and several thousand degree ($\sim$1 eV) temperatures. Densities of condensed matter can now be increased over an order of magnitude, causing novel transformations and new physical and chemical phenomena to occur. Growth in this area has been made possible by advances in diamond-anvil cell methods coupled with a wide range of probes, including x-ray diffraction, spectroscopy, inelastic scattering, radiography, and infrared spectroscopy using synchrotron radiation. Examples include investigations of dense hydrogen; transformations in molecular materials; novel ceramics; new types of superconductors, electronic, and magnetic materials; and liquids and amorphous materials. Particularly exciting are new developments in time resolved methods and coupling of static and dynamic compression techniques made possible by the creation of new large-scale facilities and novel technologies.

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