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Equation of state measurement of warm dense aluminum and carbon[1] KATERINA FALK, JOHN BENAGE, ROBERT WATT, DAVID MONTGOMERY, JAMES WILLIAMS, DEREK SCHMIDT, Los Alamos National Laboratory, DPEOS TEAM — The equation of state of light elements is essential to understanding the structure of Jovian planets and inertial confinement fusion (ICF) experiments. Here we present results from a combination of experimental techniques used to characterize thermodynamic properties of warm dense matter (WDM). The Omega laser was used to create WDM conditions, solid density at ~ 10 eV, using the novel technique of laser driven shock and release. This technique takes advantage of recent shock results on low density aerogel foam that enable the initially strongly shocked target material to undergo a large pressure release into a well-characterized low density pressure standard. The primary diagnostic is for the WDM target is spatially resolved x-ray Thomson scattering, which provides a direct and simultaneous measurement of the density, temperature, and ionization state of the WDM target material, either aluminum or carbon. To complete the EOS determination, VISAR is used to determine the shock velocity in the pressure standard and therefore to determine the pressure in the WDM material. Recent developments in the design of the new imaging spectrometer to enable better scattering data will be presented. Various equation of state models are compared to the experimental results.

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