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Observations of intrinsic shock front anisotropy in diamond[1] P.M. CELLIERS, D.J. ERSKINE, D.G. BRAUN, S.T. PRISBREY, G.W. COLLINS, R.J. WALLACE, O.L. LANDEN, J. BIENER, A.V. HAMZA, LLNL, C. WILD, E. WOERNER, Fraunhofer Institute, Freiburg, Germany, A. NIKROO, General Atomics, San Diego, CA — We have fielded a high resolution two-dimensional imaging VISAR at the OMEGA laser facility. Over an 800 μm field this instrument captures small spatial variations in the velocity across a shock front. The detection limit is δV $\sim$10 m/s giving relative sensitivity $\delta V/V \sim$ few x 10^{-4}, where $V \sim$ 20 km/s is the shock velocity. The instrument can resolve spatial mode wavelengths as small as 2.5 μm. We have observed shock front non-uniformities on multi-Mbar shock fronts after passing through polycrystalline diamond. The shock fronts show significant structure at amplitudes below the threshold for shock melting, with a high degree of non-uniformity on spatial scales of a few microns or less. Above the threshold for shock-melting (after the shock front entered the coexistence region, partial melt, near 6 Mbar) the level of non-uniformity diminished significantly. We are continuing experiments on diamond and other materials to elucidate details of the shock front structure above and below the melt transition.

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