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Two-dimensional Imaging Velocimetry of High-Strain Rate Deformation in Silicon SUZANNE ALI, Univ. of California, Berkeley, RAYMOND SMITH, Lawrence Livermore National Lab, CYNTHIA BOLME, Los Alamos National Lab, DAVID ERSKINE, PETER CELLIERS, JON EGGERT, Lawrence Livermore National Lab, JUE WANG, Princeton University, STEPHANIE BRYGOO, Commissariat à l'Énergie Atomique, BENJAMIN HAMMEL, None, GILBERT COLLINS, Lawrence Livermore National Lab, RAYMOND JEANLOZ, Univ. of California, Berkeley — The novel 2D-VISAR diagnostic that has been developed over the past few years has provided an unprecedented view into the details of material deformation during shock compression. Utilizing a two interferometer system with quadrature phase recording and an ultrashort illumination pulse, a snapshot of the 2D velocity field of a shocked sample was obtained and the elastic and plastic breakout patterns were extracted. This diagnostic was used to measure the 2D velocity map of shock compressed single crystal silicon in three orientations, <100>, <110> and <111>. Varying the probe delay allowed us to track the evolution of complex deformation dynamics at the silicon interface. Characteristic breakout structures were found for each of the three orientations. The elastic breakout shapes demonstrated a dependence on the anisotropic wave speeds in the crystal and the plasticity was found to depend on the crystallographic slip planes.

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