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Shock compression microscopy: shocked materials with high time and space resolution DANA DLOTT, University of Illinois at Urbana-Champaign — Our group has developed the "shock compression microscope" to study shocked solids and liquids with high time and space resolution. It consists of an inverted optical microscope, and a laser flyer plate launcher with a high-speed photon Doppler velocimeter. Flyer plates and samples are produced in the form of disposable arrays containing up to 200 individual samples. An array of optical diagnostics are used to measure pressure, density, temperature, composition and structure in real time. This general-purpose instrument launches flyer plates at 0-6 km/s, and the flyer plates produce reproducible flat and parallel impacts with a rise time of 0.5 ns. Shock durations can be varied from 2-20 ns. In this presentation, I will discuss the microscope and give an overview of some recent applications: shock initiation of plastic bonded explosives and real-time imaging of hot spots, shock-to-detonation on a tabletop where we study reproducible detonations, and shock compression of non-explosive materials including nanoparticle shock absorbers and biological systems.

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