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Fluorescent probes for shock compression spectroscopy of microstructured materials JAMES CHRISTENSEN, ALEXANDR BANISHEV, DANA DLOTT, University of Illinois at Urbana-Champaign — We are developing fluorescent probes to obtain time-resolved two-dimensional pressure maps of microstructured materials under shock compression. We have fabricated dye-doped silica nano- or micro-spheres which may be dispersed throughout a microstructured sample. Alternatively we can grow a thin layer of dye-doped silica on the surface of a larger grain. The microspheres were embedded in PMMA and shocked to 3–8.4 GPa using laser-driven flyer plates. The shocked emission had both a redshift and an intensity loss. It is easier in two dimensions to measure intensity changes rather than spectral shifts. When fluorescent dye was dispersed freely in PMMA, the intensity loss was much slower than the spectral shift. But by encapsulating the dye in silica, the emission became not only brighter but the intensity loss occurred on the same timescale as the redshift. Current research focuses on studies of the photophysical mechanism of dye response to shock and using this technique in granular media such as sand under shock compression.

James Christensen
University of Illinois at Urbana-Champaign

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