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Photophysics of Fluorescent Probes Under 1-10 GPa Shock Compression WEILONG LIU[1], JAMES CHRISTENSEN, WILLIAM BASSETT, DANA D. DLOTT, University of Illinois at Urbana-Champaign — The use of fluorescent probes in shocked microstructured media can permit measurements of local pressures and temperatures with high time and space resolution. Here we focus on the use of a highly-emissive dye, rhodamine 6G (R6G). In order to understand the fundamental mechanisms of R6G photophysics under extreme conditions, we synchronized a femtosecond laser and streak camera with a laser-driven flyer plate shock compression system. We studied R6G emission lifetimes and spectra under shock conditions and under static high pressure when the dye was dissolved in polymethylacryate (PMMA) or when the dye was encapsulated in silica microspheres, where R6G is superemissive. Under shock compression, the emission spectra of R6G redshifts. It is difficult to measure local pressures using the redshift, because one would have to spectrally resolve the emission from every spot in the shocked material. It would be much easier to measure the emission intensity at each location. We have found that the R6G emission intensity also changes in a shock, so it is useful to relate the intensity changes to local shock conditions. Our measurements show the intensity changes in a shock because the fluorescence lifetime drops from about 3.5 ns at ambient pressure to about 1 ns at 10 GPa.

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