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Laser-driven flyer plates for reactive materials research HIROKI FUJIWARA, KATHRYN BROWN, RUSTY CONNER, DANA DLOTT[1], University of Illinois — We have developed a laser-driven flyer plate apparatus to study shock-induced chemistry of reactive materials (RM) containing Al nanoparticles. Reactive materials are generally composed of fuel and oxidizer particles. Under shock compression these components mix and react to liberate energy and do work. Understanding how shocked nanoparticle compositions undergo exothermic chemistry is a difficult problem in materials science, since the reactivity is a function of both chemical and materials parameters. Laser-launched flyer plates coated with a small amount of the RM are made to impact a window and their emission spectrum is studied. Achieving a good reproducible launch is a problem, and is generally limited by the quality of the laser beam profile and the flyer target. Our approach exploits recent advances in beam shaping and microfabrication. This material is based on work supported by the US Army Research Office under award number W911NF-04-1-0178 and the Air Force Office of Scientific Research under award number FA9550-06-1-0235. Kathryn Brown acknowledges support from the Stewardship Sciences Academic Alliance Program from the Carnegie-DOE Alliance Center under grant number DOE CIW 4-3253-13.

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