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Comparing the shock sensitivity of RDX particles using laser-driven flyer plate impacts STEVEN DEAN, FRANK DE LUCIA, JR., JENNIFER GOTTFRIED, US Army Research Laboratory — Understanding the response of an energetic material to shock stimuli is important for both safety and performance concerns. Typical shock impact experiments require multiple grams of material for testing. Here, laser-driven flyer plates were used to apply various shock strengths to RDX pressed into double-sided tape to evaluate the utility of the experiment as a means to probe shock sensitivity. Three different RDX particle sizes were studied: nano-RDX (200 nm), Class 5 RDX (97% particles <43 μm) and Class 1 RDX (98% particles <841 μm). Key advantages of the laser-driven flyer plate technique are its low cost and high throughput, with the potential to prepare and conduct a hundred launches in a day using only milligrams of material. Flyers were generated by focusing the spatially-shaped pulse of an Nd:YAG laser (10 ns, up to 1.2 J, 1064 nm) onto the adhesive interface between an Al foil (25 m thick) and a borosilicate glass substrate, forming a plasma. This plasma rapidly expands and launches an Al disk approximately 800 m in diameter at velocities up to 2.4 mm/μs. The disk crosses a small air gap, and impacts the RDX sample. The material's response was determined by monitoring visible emission from the impact site with a photomultiplier tube. Initial results for the impact threshold required to induce a reaction in the RDX indicate the method is capable of correctly sorting materials by shock sensitivity (*i.e.*, Class 1 RDX $>$Class 5 RDX $>$nano-RDX).

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