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Laser-Driven Miniflyer System for Shock Compression Studies¹ SEAN KELLY, CHRISTOPHER MILLER, HIROAKI KISHIMURA, NARESH THADHANI, Georgia Institute of Technology — A laser-driven miniflyer system is being set-up for small-scale shock compression experiments on inert and reactive materials. The system consists of an Nd:YAG 3 J driving laser, beam shaping optics, an impact assembly and velocity measurement diagnostics. The beam from the driving laser travels through a BK7 substrate to irradiate a thin film composite of carbon, aluminum oxide, and aluminum. Copper foils (flyers) of 25 μ m, 50 μ m or 100 μ m thickness and 3.2 mm or 2.4 mm diameter are mounted to the aluminum layer. The rapidly expanding carbon plasma, thermally buffered by the aluminum oxide layer and physically constrained by the aluminum coating, launches the copper flyer up to 1 km/s to impact the target. VISAR and Photonic Doppler Velocimetry (PDV) are used to investigate the flyer velocity and acceleration with respect to the driving laser energy for different thicknesses and diameters of flyer. Data from this study are used as a foundation for small-scale shock impact studies performed with the laser-driven miniflyer system on inert and reactive materials.

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