

Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Improving laser-driven flyer velocity with high absorptance layers

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— Laser driven flyers are produced on the interaction of a laser pulse with a thin film of metal. When an Nd:YAG laser is focussed through a transparent substrate onto a 5 micron film of aluminium, a fraction of the metal is ablated. The associated expansion causes the remaining aluminium to be punched from the film and launched as a discrete flyer. Due to the high reflectivity of aluminium, some of the laser energy is lost through reflection at the substrate/metal boundary. By introducing metals which exhibit stronger absorption at the Nd:YAG wavelength (1064 nm), the laser coupling to the flyer is improved, resulting in faster flyer velocities for a given pulse energy. This paper discusses the results of using Hf, Ge, Zn and Ti to improve the coupling of the Nd:YAG laser to the flyer.

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Date submitted: 17 Feb 2011

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