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Generation of Ultrafast-Laser-Produced Heavy Ions for Fast Ignition KIRK FLIPPO, B.M. HEGELICH, M.J. SCHMITT, J.A. COBBLE, D.C. GAUTIER, R. GIBSON, R. JOHNSON, S. LETZRING, J.C. FERNÁNDEZ, Los Alamos National Lab — It has been pointed out that Fast Ignition (FI) is possible with a range of ion species [Temporal *et. al* Phys. Plasma 2002], and there might be advantages in using ions heavier than protons. In the last few years it has become apparent that the surface contamination on laser-acceleration targets is a major impediment to the acceleration of the actual target ions. To this end we have performed experiments at the Los Alamos Trident Laser facility using a 150 ps pulse to ablatively clean targets before being irradiated by a 30 TW pulse to accelerate the bulk target ions to high energies. This process was used on targets consisting of 15 microns of vanadium. The 150 ps pulse rids the rear of the target of its omnipresent surface contamination layer, consisting mainly of water vapor and hydrocarbons, and allows the Trident TW Short-pulse arm to illuminate the target and accelerate ions via the Target Normal Sheath Acceleration (TNSA) mechanism. Normally, ions with the lightest charge to mass ratio (i.e. protons) would be accelerated preferentially; however with the contamination layer removed, the TNSA mechanism is able to accelerate the heavy target ions to high energies. The experimental achieved parameters, such as laser beam conversion efficiency, ion energy, and beam divergence are reported, and ablation results are compared to the LASNEX code. We also discuss future prospects to scale up this technique for FI.

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