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Short-Pulse Heavy Ion Production via Target Laser-Ablation-Cleaning and Proton Acceleration Suppression KIRK FLIPPO, B.M. HEGELICH, M.J. SCHMITT, E. DODD, J.A. COBBLE, D.C. GAUTHEIR, R. GIBSON, R. JOHNSON, S. LETZERING, J.C. FERNÁNDEZ, LANL, T. LIN, A. MAKSIMCHUK, M. REVER*, D. UMSTADTER*[1], FOCUS Center, Univ. of Michigan — In the last few years it has become apparent that the surface contamination on laser ion-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 one arm of the Trident laser at 150 ps to ablatively clean the target's rear-surface. The front-surface is then irradiated by the Trident TW Short-pulse to accelerate the heavy-ions to high energies. This process was used on targets consisting of 15 microns of vanadium. Normally ions with the lightest charge to mass ratio (i.e. protons) would be accelerated preferentially from the surface at the expense of heavier ions. However, with the rear contamination layer removed, the TNSA mechanism is available to accelerate the bulk material ions to high energies. A lower energy proton component from the front surface is also present and has been observed experimentally and modeled recently with the TRISTAN PIC code, and mitigation is discussed. We report on the ion beam parameters achieved to date, including laser-beam conversion efficiency, ion energy, and beam divergence. Our ablation results are compared to the LASNEX code to validate and improve our predictive capabilities for future experiments.

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