Abstract Submitted
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Experimental Investigation of Molecular Species Formation in Metal Plasmas During Laser Ablation[1] H. RADOUSKY, J. CROWHURST, T. ROSE, M. ARMSTRONG, E. STAVROU, J. ZAUG, D. WEISZ, Lawrence Livermore National Laboratory, M. AZER, M. FINKO, D. CURRELI, University of Illinois Urbana-Champaign — Atomic and molecular spectra on metal plasmas generated by laser ablation have been measured using single, nominally 6-7 ns pulses at 1064 nm, and with energies less than 50 mJ. The primary goal for these studies is to constrain the physical and chemical mechanisms that control the distribution of radionuclides in fallout after a nuclear detonation. In this work, laser emission spectroscopy was used to obtain *in situ* data for vapor phase molecular species as they form in a controlled oxygen atmosphere for a variety of metals such as Fe, Al, as well as preliminary results for U. In particular, the ablation plumes created from these metals have been imaged with a resolution of $\sim$ 10 ns, and it is possible to observe the expansion of the plume out to 0.5 us. These data serve as one set of inputs for a semi-empirical model to describe the chemical fractionation of uranium during fallout formation.

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