Abstract Submitted
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Why Nuclear Forensics Needs New Plasma Chemistry Data[1] T. ROSE, M. ARMSTRONG, A. CHERNOV, J. CROWHURST, Z. DAI, K. KNIGHT, B. KOROGLU, H. RADOUSKY, E. STAVROU, D. WEISZ, J. ZAUG, Lawrence Livermore National Laboratory, M. AZER, M. FINKO, D. CURRELI, University of Illinois Urbana-Champaign — The mechanisms that control the distribution of radionuclides in fallout after a nuclear detonation are not adequately constrained. Current capabilities for assessing post-detonation scenarios often rely on empirical observations and approximations. Deeper insight into chemical condensation requires a coupled experimental, theoretical, and modeling approach. The behavior of uranium during plasma condensation is perplexing. Two independent methods are being developed to investigate gas phase uranium chemistry and speciation during plasma condensation: (1) laser-induced breakdown spectroscopy and (2) a unique steady-state ICP flow reactor. Both methods use laser absorption spectroscopy to obtain *in situ* data for vapor phase molecular species as they form. We are developing a kinetic model to describe the relative abundance of uranium species in the evolving plasma. Characterization of the uranium-oxygen system will be followed by other chemical components, including 'carrier' materials such as silica. The goal is to develop a semi-empirical model to describe the chemical fractionation of uranium during fallout formation.

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