

Abstract Submitted  
for the MAR12 Meeting of  
The American Physical Society

**Classical models for electron capture by highly charged ions in the thin film regime** JOSH POMEROY, National Institute of Standards and Technology, RUSSELL LAKE, Clemson University — We present an extension of the classical over the barrier (COB) model[1] for highly charged ions (HCIs) that describes thin dielectric films on metal surfaces, bridging the bulk metal and bulk insulator regimes. Motivated by recent experiments [2,3], we detail the onset of charge transfer between a HCI and metal covered with a dielectric thin film. In this talk, capture distances as a function of  $C_{60}$  film thickness on Au(111) will be presented. For ultrathin films, electron capture begins from filled levels in the metal and the  $C_{60}$  film decreases the potential barrier for charge transfer and increases the critical distance compared to clean Au(111), increasing the time available for above-surface relaxation. This is consistent with the new observation of increasing HCI-induced electron emission yield as a function of film thickness [3]. As film thickness grows and reaches a critical value, the first captured electrons originate from the film at the distance expected for an insulator target.

[1] J. Burgdörfer et al. Phys. Rev. A 44, 5674–5685 (1991)

[2] R.E. Lake et al. Phys. Rev. Lett. 107, 063202 (2011)

[3] E. Bodewits et al. Phys. Rev. A 84, 042901 (2011)

Josh Pomeroy  
National Institute of Standards and Technology

Date submitted: 13 Dec 2011

Electronic form version 1.4