

Abstract Submitted  
for the MAR07 Meeting of  
The American Physical Society

**Formation and Distribution of Neutral Transition Metal Oxide Clusters: Single Photon Ionization at 26.5 eV** FENG DONG, SCOTT HEINBUCH, JORGE ROCCA, ELLIOT BERNSTEIN, NSF ERC for Extreme Ultraviolet Science and Technology, Colorado State University Departments of Chemistry and Electrical and Computer Engineering — A single photon of an EUV laser (26.5 eV) has enough energy to ionize any metal oxide cluster generated in a molecular beam. Neutral vanadium, niobium, and tantalum oxide clusters are studied by single photon ionization employing a 26.5 eV EUV laser. During the ionization process, metal oxide clusters are virtually free of fragmentation. The most stable neutral metal oxide clusters under saturated oxygen conditions can be represented as  $(\text{MO}_2)_{0,1}(\text{M}_2\text{O}_5)_y$  ( $\text{M}=\text{V}, \text{Nb}, \text{Ta}$ ). Both O-rich and O-deficient clusters can be observed. Oxygen-rich metal oxide clusters with high ionization energy are detected by 26.5 eV, but not by 10.5 eV, ionization. For O-rich clusters  $\text{M}_x\text{O}_y\text{H}_z$  species are also observed for the first time. Given these experimental capabilities, neutral cluster reactions and reactivity can be studied. We will present preliminary results of these studies.

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Date submitted: 22 Nov 2006

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