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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 $(MO_2)_{0,1}(M_2O_5)_y$ (M=V, Nb, 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 $M_xO_yH_z$ 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.

Feng Dong
Colorado State University

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