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STM study of sizeselected Ag and Au nanoclusters on titania surface XIAO TONG, LAUREN BENZ, PAUL R. KEMPER, MICHAEL T. BOWERS, HORIA METIU, STEVEN K. BURATTO, Department of Chemistry & Biochemistry, University of California, Santa Barbara, Santa Barbara, CA 93106 — The catalytic activity Au and Ag nanoclusters on oxide supports is known to be strongly dependent on the size of the cluster and its interaction with the surface. In this study, we have probed the size dependence of adsorption geometries by depositing size-selected clusters of Agn+ and Aun+ (n = 1-7) from the gas phase onto single crystal rutile TiO2 (110) (1x1) surfaces at RT under soft-landing (< 2 eV/atom) conditions. We analyze the clusters on the surface using UHV-STM and compare the resulting structures with theory. In the case of Ag1+ and Ag2+ clusters deposited, we observe large, sintered clusters indicating high mobility for these species on the surface. For Agn+ (n > 2) clusters deposited, however, we observe a high density of intact clusters bound to the surface and no large, sintered clusters indicating that these species have very limited mobility on the surface. In the case of Aun+ clusters deposited, we observe large, sintered clusters only from the deposition of Au1+ and a high density of intact clusters from the deposition of Aun+ (n > 1). In cases where we observe intact clusters we can observe the binding site and geometry of the cluster in the STM image and compare these with structures calculated using density functional theory (DFT) as well as structures observed in the gas phase.

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