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Surface defect-mediated reactivity of TiO2(110) toward gold MINGHU PAN, Department of Physics and Astronomy, The University of Tennessee, KEN PARK, Department of Physics, Baylor University, VINCENT MEUNIER, WILLIAM SHELTON, Computer Science and Mathematics Division, Oak Ridge National Laboratory, SERGEI KALININ, ARTHUR BADDORF, Condensed Matter Sciences Division, Oak Ridge National Laboratory, E.W. PLUMMER, Department of Physics and Astronomy, The University of Tennessee — The novel properties of metal clusters supported by transition metal oxides originate from the specific interactions of metal clusters mediated by an oxide substrate, including local reduction below the cluster. In this work, we present recent results on the interactions between line defects on a TiO_2(110) and their reactivity toward Au nano-particles studied by a combination of Scanning Tunneling Microscopy and Spectroscopy. High-resolution STM images, interpreted with first-principles theory, show that the observed one-dimensional strands have partially reduced Ti atoms coordinated at oxygen octahedral sites. When gold nano-particles of diameters 5 nm and less are deposited on the sub-stoichiometric rows of TiO_x, the strands, like point defects and step edges on TiO_2(110), serve as nucleation sites for gold nano-clusters. Further reactions of the Au/TiO_2 system with O_2 and CO are discussed.

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