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Polycrystalline TiO₂ films with silver nanoclusters for photocatalysis FRANK WOMACK, FEI WANG, ASOKA SEKHARAN, PHILLIP SPRUNGER, RICHARD KURTZ, Department of Physics and Astronomy, Louisiana State University — Metallic Ag nanoclusters nucleate on TiO₂(110) due to weak substrate interactions and the need to minimize their surface free energy. EELS results on single crystal TiO₂ have shown that those nanoclusters have a distinct plasmon resonance at 3.7 eV which can be red-shifted when incorporated within a dielectric of titania. Polycrystalline oxides consist of mostly low surface free-energy faces and nanoclusters are expected to nucleate when dosed with Ag. We will present a combined synchrotron-based photoemission, Auger, and optical spectroscopy study of polycrystalline TiO₂ films functionalized with Ag. We have made thin films of TiO₂ by thermal evaporation of titanium followed by oxidation at elevated temperatures. Ag was then deposited via thermal evaporation of silver, and covered with additional layers of Ti that were subsequently oxidized and characterized with photoelectron and optical spectroscopies. We will discuss these data in the context of nanocluster formation *vs* bandgap doping.

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