ANNOUNCEMENT

UNIVERSITÄT SALZBURG

Vortragsankündigung

Mittwoch, 20. November 2019, 17.00 Uhr

Seminarraum I (JAK2AOG1.33), Jakob-Haringer-Straße 2a

Prof. Gregory S. Rohrer
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"Controlling polar domains on oxide surfaces to optimize photochemical reactivity"

For many years, researchers have sought metal oxide catalysts that efficiently split water in sunlight to produce hydrogen fuel. On the surfaces of oxide semiconductors with polar domains, electrons are attracted to positively terminated domains where they promote reduction reactions and holes are attracted to negatively charged domains where they promote oxidation. The separation of charge carriers reduces charge carrier recombination and the back reaction of the reduced and oxidized products. Charged domains can arise at the surfaces because of piezoelectricity, flexoelectricity, or differences in the chemical termination of the surface. Here, we report results showing that it is possible to optimize the overall photochemical reactivity of $SrTiO_3$ and $BaTiO_3$ by controlling relative areas of the polar surface regions and the surface charge through solution pH and processing paths. This talk will also describe a new systematic study of the rate of hydrogen production from $BaTiO_3$, $SrTiO_3$, and $TiO_2/BaTiO_3$ heterostructured catalysts as a function of materials and reaction parameters. For the single phase catalysts, we have found that the surface charge and solution pH are important parameters for optimizing reactivity. For the heterostructured catalyst, the crystallization temperature is critical for balancing the compromise between surface area and crystallinity.