

# Details of Oxide Structures Revealed by Studies of Sensitized Films

Meyer/UNC

## Scientific Achievement

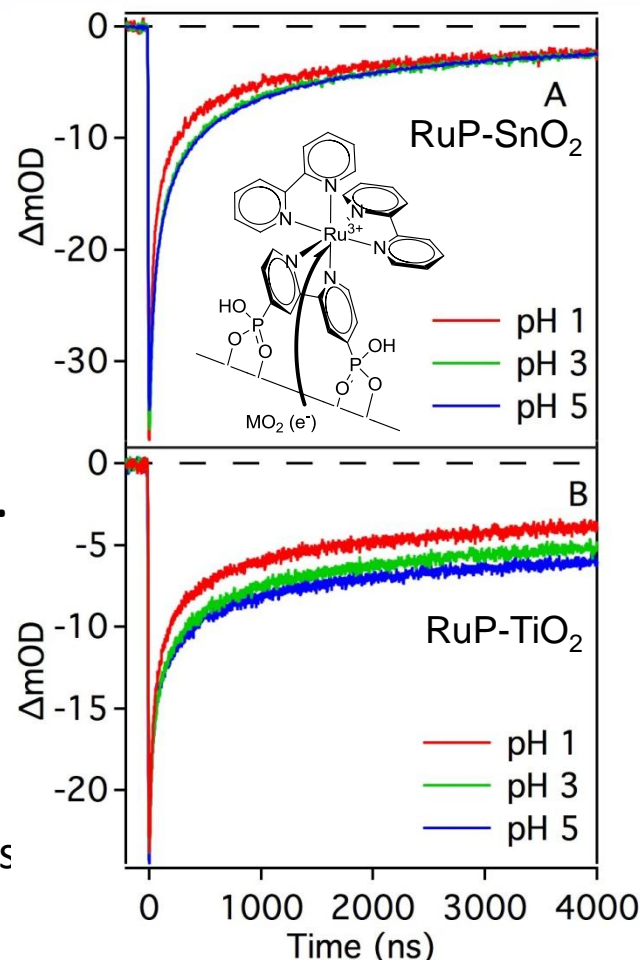
Found that recombination between electrons in metal oxides and oxidized chromophores is pH dependent for sensitized  $\text{TiO}_2$  but not  $\text{SnO}_2$ .

## Significance and Impact

Interfacial charge recombination dynamics provide a new way to probe the complex electronic structure of the oxide semiconductors and the intricate charge transport mechanisms, information necessary for device applications.

## Research Details

- Electrochemical measurements were used to probe the distribution of intra-band-gap trap states of metal oxide films under various conditions.
- As measured by transient absorption spectroscopy, back electron transfer dynamics in sensitized  $\text{SnO}_2$  and  $\text{TiO}_2$  films correlate with the distribution, identity and occupation of localized trap states within the nanocrystalline metal oxide films, which are pH specific.



**Back Electron Transfer:** Transient absorption measurements of (A) RuP- $\text{SnO}_2$  and (B) RuP- $\text{TiO}_2$  monitored at 400 nm following 532 nm excitation in aqueous  $\text{HClO}_4$  solutions at various pH.

Robin R. Knauf, M. Kyle Brennaman, Leila Alibabaei, Michael R. Norris, Jillian L. Dempsey. **2013**, Submitted, *J. Phys. Chem. C*.

Work was performed at The University of North Carolina - Chapel Hill