

# Novel Light Harvesting Polymer Sensitizers in Solar Cells

Meyer

## Scientific Achievement

Discovered that novel light-harvesting polymer sensitizers with high absorptivity and efficient energy-exciton transport resulted in a light to electric conversion efficiency.

## Significance and Impact

A new path to develop novel conjugated polymers with pendant Ru(II) complexes, resulting in efficient light collection and energy transport for the application of next generation solar cells.

## Research Details

- Ru(II)-loaded polyfluorene (PF-Ru) was covalently immobilized onto a metal oxide layer, creating a stable array on the TiO<sub>2</sub> films.
- Analysis by scanning electron microscopy (SEM) of bare TiO<sub>2</sub> film and polymer anchored TiO<sub>2</sub> film revealed an increase in the size of PF-Ru attached TiO<sub>2</sub> film.
- A light-to-electric conversion efficiency of PF-Ru sensitized solar cell exhibits the individual photo response for the PF and Ru(II) polypyridyl complex.

For photophysical studies see: Wang, L., Puodziukynaite, E., Vary, R.P., Grumstrup, E.M., Walczak, R.M., Zolotar'skaya, O.Y., Schanze, K.S., Reynolds, J.R., Papanikolas, J.M.; *J. Phys. Chem. Lett.* **2012**, 3, 2453-2457.

Photoelectrochemistry: Puodziukynaite, E., Leem, G., Reynolds, J. R., Schanze, K. S., manuscript in preparation.

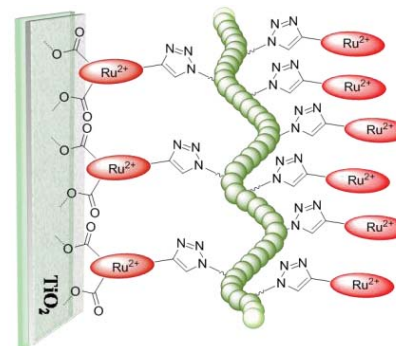
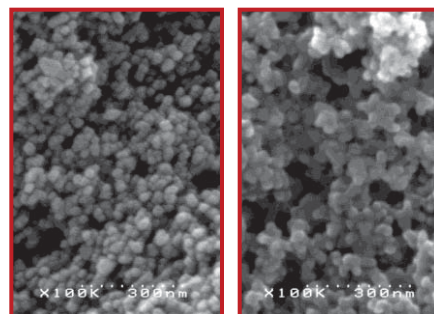
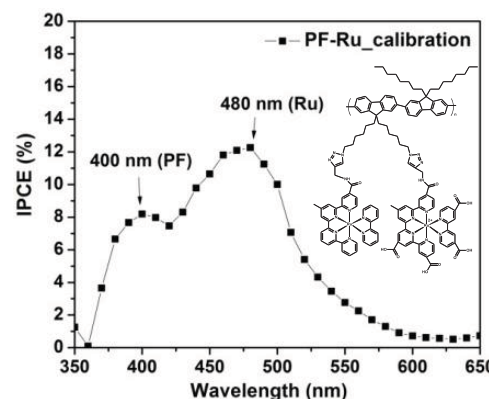


Illustration of transition metal coordinated functional polymers adsorbed on nanocrystalline TiO<sub>2</sub> with the surface anchoring group(s) at the polymer terminus end.



Immobilization of polymer sensitizers onto a nanocrystalline TiO<sub>2</sub> film. SEM images of bare TiO<sub>2</sub> surface (left) and PF-Ru anchored TiO<sub>2</sub> film (right).



Solar cell characteristics of polymer anchored TiO<sub>2</sub> films. The photocurrent action spectra (IPCE) subtracted by TiO<sub>2</sub> spectra.

Work was performed at University of Florida.



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