Making Oxygen from Sunlight and Water

Meyer

Scientific Achievement

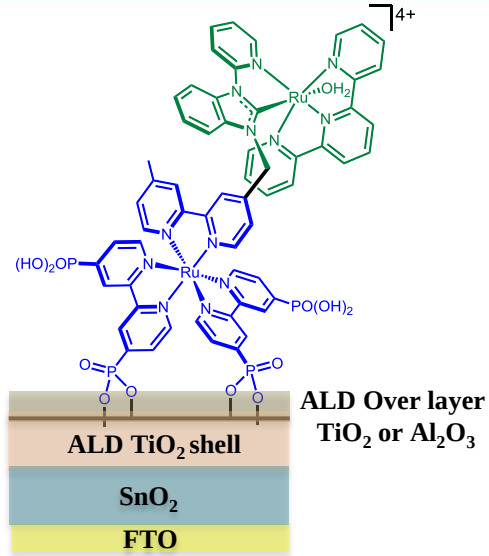
A hybrid strategy for solar water splitting is exploited based on a Dye Sensitized Photoelectrosynthesis Cell (DSPEC).
For the first time visible light water splitting shown by evolved H_2 and O_2 measurements.

Significance and Impact

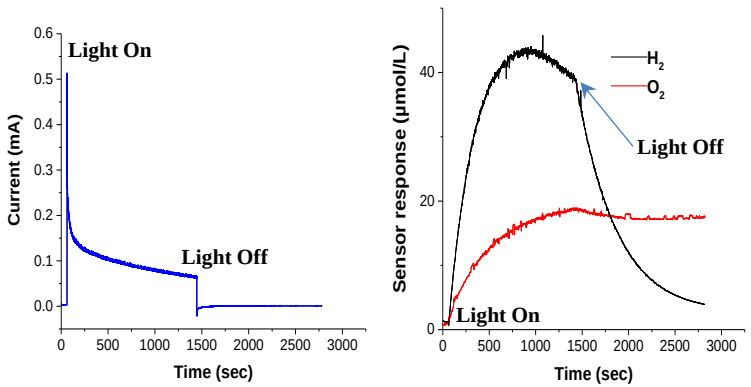
Visible light water splitting with a minimum bias (~0.4 V) has been demonstrated in a molecular assembly derivatized core/shell structure consisting of SnO_2 - with a thin overlayer of TiO_2.

Research Details

- A core/shell photoanode was created by coating a nanoparticle film of SnO_2 with a conformal layer of TiO_2 by using atomic layer deposition (ALD).
- Integration in a DSPEC with a Pt cathode with visible illumination compared to the nanoITO/TiO2 core/shell under the same conditions, showed a photocurrent increase of ~5.



ALD core/shell and ALD overlayer stabilization of a surface-bound assembly



Photocurrent, Hydrogen and oxygen evolution of a DSPEC device

High Efficiency, Sustained Visible Photoelectrochemical Water Splitting into H_2 and O_2 in a Dye Sensitized Photoelectrosynthesis Cell. Leila Alibabaei, Benjamin D. Sherman, Michael R. Norris, M. Kyle Brennaman and Thomas J. Meyer, manuscript in preparation

Work was performed at UNC Chapel Hill