

Overcoming Losses at the Counter Electrode in Quantum Dot Solar Cells by Salt Bridge Isolation

David R. Baker and Prashant V. Kamat

Department of Chemical and Biomolecular Engineering, and Radiation Laboratory

University of Notre Dame, Notre Dame, IN 46656

The components of the standard 1M Na₂S, 1M S, and 0.1M NaOH electrolyte used in quantum dot sensitized solar cells and their interactions with the counter and working electrodes are investigated. A salt bridge is used to separate the two halves of the electrochemical cell while keeping them in electrical contact. Addition of the redox couple's oxidized species is shown to enhance performance at the platinum counter electrode and is also shown to scavenge electrons at the CdS/TiO₂ working electrode with an overall detrimental effect. Addition of NaOH is also shown to decrease cell performance despite the negative shifting of TiO₂ band levels caused by pH effects. Chronocoulometric studies demonstrate the increase in activity if an iodide electrolyte is used instead of a sulfide based electrolyte due to poisoning of the platinum surface.