Bismuth Sulfide and PEDOT: PSS as Cost Effective Counter Electrode Materials for Dye-Sensitized Solar Cells

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As the energy infrastructure of nations is moving to renewable energy sources out of concern of climate change, solar energy appears to be a large exploitable resource that can be harnessed on a large scale. However, the cost of producing ultra-pure silicon (Si) ingots for the use in the manufacture of commercial silicon photovoltaics prevents the cost of electricity produced from being competitive with the fossil fuel-based energy production. An alternative to Si based solar cells would be Dye-Sensitized Solar Cell (DSSC), which are low cost, easy to manufacture and can be made semi-flexible. A DSSC is generally composed of three parts, a photo-electrode, an electrolyte and a counter electrode. Under illumination, the photoelectrode which contains complex photosensitizers, which releases an electron which is transported to the external load, leaving the photoelectrode in an oxidized state. The electrons are collected by the counter electrode and used to reduce the electrolyte. This charged electrolyte then reduces the positively charged photo-electrode, allowing the process to begin again. In this poster presentation, we will showcase the use of Bismuth Sulfide (Bi_2S_3) and PEDOT: PSS, which is conductive polymer, as a means of reducing materials cost of DSSC, replacing more expensive counter electrode materials such as platinum and ruthenium.