Nanoporous n-TiO_2/selenium/p-CuCNS photovoltaic cell

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Abstract. On illumination, selenium deposited on nanoporous n-TiO_2 transfers photogenerated electrons into TiO_2. When p-CuCNS is coated on top of the selenium deposited on nanoporous n-TiO_2, holes are directed into the p-CuCNS. A photovoltaic cell of nanoporous n-TiO_2/selenium/p-CuCNS based on the above charge transfer process generates a photocurrent of ~3.0 mA cm^{-2} and a photovoltage of ~600 mV at 800 W m^{-2} simulated sunlight. The efficiency of the cell seems to be limited by surface recombination and the presence of voids in the TiO_2 film. Photoelectrochemical experiments also indicate that when selenium is deposited on nanoporous n-TiO_2 photogenerated electrons in selenium are efficiently transferred to TiO_2.