

Sensitization of nano-porous films of TiO_2 with santalin (red sandalwood pigment) and construction of dye-sensitized solid-state photovoltaic cells

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Abstract

Santalin, a pigment extracted from red sandalwood strongly surface complex to TiO_2 , sensitizing nano-porous film of TiO_2 to the visible spectrum. Because of the stability of such films, dye-sensitized solid state photovoltaic cells of sandwich structure (nano-porous $n\text{-TiO}_2$ /santalin/ p -type semiconductor) can be constructed by depositing $p\text{-CuI}$ or $p\text{-CuCNS}$ on santalin coated nano-porous films of TiO_2 . High stability of santalin complexed to TiO_2 enables deposition of the p -type semiconductor without destroying the pigment layer. Light absorbed by the dye-molecules injects electrons into TiO_2 and holes into CuI (or CuCNS) generating short-circuit photocurrent $\sim 6 \text{ mA/cm}^2$ and photovoltage $\sim 450 \text{ mV}$ at 800 W/m^2 simulated sunlight. © 1998 Elsevier Science S.A. All rights reserved.

Keywords: Santalin; Nano-porous film of TiO_2 ; Dye-sensitized solid-state photovoltaic cells
