

Iodine-Free Dye-Sensitized Solar Cells Employing Hole Transporting Materials

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A high conducting polymer poly(3,4-ethylenedioxythiophene), i.e. PEDOT were synthesized using solid state polymerization (SSP). ¹H NMR, FT-IR spectroscopy, and differential scanning calorimetry(DSC) results present the successful solid state polymerization in the TiO₂ pore. Wide angle X-ray scattering (WAXS) showed the degree of crystallinity of polymers and their structural changes. Field emission scanning electron microscopy (FE-SEM) results represent the PEDOT well-penetrated structure into the TiO₂ pore. All the cell properties of energy conversion efficiency and incident photon to current efficiency(IPCE) for the hole transport material continuously increased with increasing anion size of Li salts. The thermal polymerized PEDOT based I₂ free DSSC with additive of various anion sizes exhibited the increased energy conversion efficiency from 4.28 to 5.44 %. In the case of the thermal polymerization, conductivity showed high value about 10 S/cm at room temperature compared with that of using oxidant polymerization.