

## Effects of polymer in inorganic nanocomposite electrolytes on the performance of quasi-solid-state dye-sensitized solar cells

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In this report, the cell performance of quasi solid dye-sensitized solar cells based on the low molecular weight Poly(ethylene glycol) (PEG400), 1-methyl-3-propylimidazolium iodide (MPII), iodine ( $I_2$ ) with and without the addition of hybrid inorganic-organic nanoparticle ( $TiO_2$ -POEM,  $SiO_2$ -POEM) is investigated. The effect of hybrid inorganic-organic nanoparticles ( $TiO_2$ -POEM,  $SiO_2$ -POEM) in electrolytes, were studied on the coordination interactions (FT-IR), structure change (WAXS), gelation phenomenon (DSC, Photo), morphology and network change (EF-TEM), penetration to  $TiO_2$  photoelectrode (FE-SEM), ionic conductivity and cell photovoltaic performance of quasi solid electrolytes ( $TiO_2$ -POEM/PEG400,  $SiO_2$ -POEM/PEG400). The quasi solid dye-sensitized solar cells with PEG400 electrolyte including 10wt% hybrid inorganic-organic nanoparticles ( $TiO_2$ -POEM,  $SiO_2$ -POEM) showed the best photovoltaic performance. (short circuit current ( $J_{sc}$ ) of 9.142, 8.813 mA/cm<sup>2</sup>, open circuit voltage ( $V_{oc}$ ) of 0.628, 0.679V, fill factor (FF) of 0.572, 0.481 and the overall solar energy conversion efficiency ( $\eta$ ) of 3.29, 2.88% under illumination of 100mW/cm<sup>2</sup>, respectively)