Enhanced photoresponses of polypyrrole on surface modified TiO_2 with self-assembled monolayers

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Received 30 January 2006; accepted 29 April 2006
Available online 7 May 2006

Abstract

Photodevices comprising covalently grafted polypyrrole films on surface modified mesoporous TiO_2 substrates via 3-(trimethoxysilyl) propyl methacrylate were fabricated and tested their performances with a counter electrode having a thin layer of gold. Significant photoresponses were observed with the addition of an ionic liquid, l-ethyl-3-methylimidazolium bis-trifluoromethylsulfonyl amide containing 0.2 M LiTf2N and painting a layer of graphite on the surface of PPY. The cell TiO_2/PPY-C/Au cell delivered a short circuit current of ~600 $\mu A\,cm^{-2}$ with an open circuit voltage of ~500 mV under the irradiation of 100 $mW\,cm^{-2}$ (AM 1.5). The average corresponding fill factors and the efficiencies were 0.51 and ~0.2%, respectively.

Keywords: TiO_2; Polypyrrole; Solid-state photocells; Hole transport materials