



Structure, Design and Fabrication of a Novel Conducting Polypyrrole-Based Photovoltaic Cell and Storage Device

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Abstract: Conducting polypyrrole-based photovoltaic cells and storage devices were designed and fabricated as an alternative to silicon-based solar cells to address the world's need for a clean and renewable energy source. The photovoltaic cells and storage devices constructed are (1) indium-tin-oxide/polypyrrole/n-Si/aluminum (ITO/Ppy/n-Si/Al) and (2) indium-tin oxide/polypyrrole/dielectric/aluminum (ITO/Ppy/dielectric/Al) in a wet, dry, or ionic-solution-impregnated-polypyrrole sandwich configuration. Dielectrics that were used and tested are glass, paper, varnish, and paper/varnish. The device also functions as a storage device, eliminating the need for a battery to store generated electricity. Under halogen lamp illumination, the ITO/Ppy/paper/Al photovoltaic storage device using ionic-solution-impregnated-polypyrrole film obtained an open-circuit voltage as high as 1.128V. Under solar intensity of about 100W/m², a short-circuit current as high as 7.35mA was obtained from the ITO/Ppy/paper/varnish/Al photovoltaic storage device using ionic-solution-impregnated-polypyrrole film.

Key Words: solar cell; conducting polypyrrole; photovoltaic cell; storage device