SYNTHESIS AND ELECTRGRAFTING OF NEW FUNCTIONAL POYTHIOPHENE ONTO ITO ELECTRODE FOR ORGANIC SOLAR CELLS

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Abstract

Organic photovoltaic (OPVs) cells are viewed as one of the most promising candidates for low cost solar cells because of the possibility of a simple and cheap production on flexible and large area substrates. The best performing solar cells often contain a poly(3,4-ethylenedioxythiophene) : polystyrenesulfonate (PEDOT:PSS) thin coating as optical spacer layers between the photo-active layer and ITO electrode. This polymer blend is usually applied in organic electronics as a hole collecting interfacial modification layer on ITO. The introduction of the PEDOT:PSS layer increase the stability and performance of organic solar cells, but various problems related to this layer PEDOT:PSS have been reported in the literature.

In order to improve the stability and performance of organic solar cells at long term, we propose a new approach that consists in replacing the PEDOT:PSS layer by chemically linked polythiophene onto ITO electrode. In this work, we present the synthesis and electrografting of different polythiophene derivatives with a high regioregularity functionalized with acrylates pendant groups that are necessary for the strong anchoring of the polymer to ITO. The synthesized materials were electrografted onto ITO electrodes by cathodic polymerization of the acrylates groups, and the so-obtained polythiophene films were characterized by UV-visible, ATR and AFM.