Synthesis, Optical and Electrochemical Properties of Naphthothiadiazole-Based Donor-Acceptor Polymers and Their Photovoltaic Applications

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The preparation and investigation of the physical properties of a series of low energy band gap alternating donor-acceptor polymers comprising 4,9-linked di-2-thienyl-2,1,3-naphthothiadiazole units and carbazole, anthracene, or fluorene units with alkoxy or alkyl substituents are presented. The influence of replacing 2,1,3-benzothiadiazole (BT) with 2,1,3-naphthothiadiazole (NT) in this series of conjugated polymers is investigated, and the optical, electrochemical with photovoltaic properties of these three polymers have examined. Photovoltaic devices with an active layer composed of thin films (65-75 nm) of polymer/PC₇₁BM blends spin-coated from chlorobenzene or a mixture of carbon disulfide and acetone were analyzed. Power conversion efficiencies (PCEs) ranging from 1.74 to 2.17% are obtained with these NT-based polymer systems of PCDTNT, showing the best performance among this series of polymers.

Keywords: conjugated polymers, optoelectronic, optical properties, 2,1,3-naphthothiadiazole (NT), photovoltaic properties.

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