Synthesis and Characterization of novel Thiophene and Carbazole-based Polymers – Optical and Electrochemical Characterization

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A donor/acceptor series of carbazole copolymers, composed of alternating 2,7-linked 3,6-difluoro-9-(1-octyl-nonyl)-carbazole units and bithiophene repeated units [P1], 5,7-bis(5-bromothiophen-2-yl)-2,3-bis(4-(2-ethylhexyloxy) phenyl) thieno[3,4-b]pyrazine repeated units [P2] and bithiophene mixed with 5,7-bis(5-bromothiophen-2-yl)-2,3-bis(4-(2-ethylhexyloxy) phenyl) thieno[3,4-b]pyrazine repeated units [P3] have been prepared following Suzuki polymerisation procedures. The route of synthesis and characterisation techniques of this novel class of materials, together with their photo-physical and electrochemical properties are presented in this study. The polymers were characterised by ¹H NMR, ¹³C NMR and Elemental Analysis. Molecular weights were estimated using gel permeation chromatography (GPC). The thermal stability behaviour for polymers was investigated using thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC). The electronic and photo-physical properties were investigated by use of cyclic voltammetry (CV) and UV-Vis spectroscopy, respectively.

Keywords: Organic solar cell, Conjugated polymer, Band gap

FULL TEXT

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