Schiff base polymer based on triphenylaminemoieties in themain chain. Characterization and studies in solar cells

Titre	Schiff base polymer based on triphenylaminemoieties in themain chain. Characterization and studies in solar cells
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Résumé en anglais	Polytriphenylamine (PTPA), a Schiff base polymer containing triphenylamine (TPA) segments and whose monomer contains triphenylamine and thiophene end groups, was synthesized. The monomer structure enabled the polymerization to be performed under conditions similar to those of thiophene. Oxidative coupling using $FeCl_3$ as oxidizing agent in anhydrous $CHCl_3$ medium was employed for the polymer synthesis. Scanning electron microscopy, fluorescence spectroscopy, and cyclic voltammetry were used to characterize the polymer. PTPA exhibited high thermal stability with a mass loss of 13.3 % at 546.5 °C. The fluorescence spectrum showed emission at 300–550 nm and the optical band gap was found to be 2.6 eV. It was also established that PTPA forms complexeswith Lewis acids, e.g. MoO_3 and CuI. Its absorption bandwidened and extended up to the near-IR. Itwas seen that PTPA is rich in π-electrons and thus can act as electron donor. The value of the Highest Occupied Molecular Orbital (HOMO) was−5.35 eV indicating its potential application in optoelectronic devices. An attempt was also made to investigate the photovoltaic potential of PTPA. Organic photovoltaic devices with various buffer layer structures, namely ITO/CuI/PTPA/C_{60}/BCP/Al, ITO/MoO_3/PTPA/C_{60}/BCP/Al, and ITO/MoO_3/CuI/PTPA/C_{60}/BCP/Al, where ITO stands for indium tin oxide and BCP for bathocuproine, were utilized for the studies. Power conversion efficiency of these devices ranged between 0.21 and 0.43% under simulated AM 1.5 illumination (100mWcm^{-2}). This result proved that polymers containing TPA in the main chain hold promising properties that would allow their use in photovoltaic devices.
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