Study of Optical and Electrical properties of copolymers based on phenylene-thiophene for electronic devices

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Organic conjugated semiconducting materials are found to be very promising for electronic applications due to several reasons, such as fast optoelectronic response and charge carrier generation at organic donor-acceptor interface, possibility of lightweight, flexible shape, versatile device fabrication schemes and low cost on large-scale production. Among these organic materials, copolymers have shown interesting results. A copolymer is a polymer derived from two or more monomeric species. By means of copolymerization it is possible to combine properties and behaviours of different polymers. In this work we have investigated the influence of different amounts of thiophene in the optical, electrical and morphological characteristics of three copolymers derived from fluorine and phenylene-thiophene: **PFFT1**, which is consisted by 75% of phenylene and 25% of thiophene in molar percentage; **PFFT2**, consisted by 50% of phenylene and 50% of thiophene; and **PFFT3**, consisted by 25% of phenylene and 75% of thiophene. We report results from devices made in a sandwich structure using the copolymers as the active layer and films of fluorine doped tin oxide (FTO) and aluminum as electrodes (FTO/PFFT/Al). Devices in the sandwich structure FTO/PEDOT/PFFT/Al were also investigated. The copolymers thin films were prepared by spin coating with different rates of rotation to compare the effect of different thickness in the electrical properties. The morphological features of the three copolymers films were investigated by images of atomic force microscopy.