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SYNTHESIS AND FILM PROPERTIES OF POLYTHIOPHENE COPOLYMERS

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Polythiophenes are an important class of conjugated polymers, with several possible applications such as light-emitting diodes, photovoltaic cells and sensors. They differ from the other conjugated polymers due to the easiness of functionalization of side-chain and to the good processability. Several different lateral groups such as alkyl, alkoxy, ester, acid and hydroxyl, the alkyl ones being the most studied. Alkyl derivatives have been successful applied in several applications, but their use in the preparation of nanocomposites with metals and oxide nanoparticles, which can highly enhance their properties for applications, are less successful due to phase separation issues. Here we report on the synthesis and characterization of copolymers of alkyl- and hydroxyl- polythiophene derivatives aiming future use in nanocomposites preparation. The presence of a more polar group on the side-chain is expected to improve the compatibility of the copolymer with the nanoparticles. Three copolymers compositions were prepared and characterized by elemental analysis, molecular weight determination by HPSEC, FTIR and NMR spectroscopies and thermal analysis. Also, the optical and wetting properties of cast films were analyzed showing differences in the emission and surface energy properties. The copolymers with higher content of hydroxyl groups showed only a slightly higher hydrophilic characteristic. Experiments on polymers compatibility with titanium dioxide nanoparticles are being carried on.