

New fluorescent crosslinked aromatic polyamides containing thiophene and furane in their backbone

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New fluorescent crosslinked aromatic polyamides containing phenylene, thiophene and furane groups in the main chain were synthesized by self-condensation from 3-(5-aminothiophen-2-yl)propenoic acid, 3-(5-aminofuran-2-yl)propenoic acid and 3-(4-((5-aminothiophen-2-yl)methyleneamino)phenyl)propenoic acid using the phosphorylation method and triphenylphosphite as initiator. The amino compounds were obtained from 3-(5-nitrothiophen-2-yl)propenoic acid, 3-(5-nitrofuran-2-yl)propenoic acid and 3-(4-((5-nitrothiophen-2-yl)methyleneamino)phenyl)propenoic by selective reduction of each nitro group and was confirmed by $^1\text{H-NMR}$ and FT-IR spectroscopy. Crosslinking of polyamides occurs by mechanism between vinyl side groups reacts with the vinyl carbon of another chain, giving rise to interchain linear crosslinking. Depending on the structure the polymers have higher degree of crosslinking. Some vinyl groups react by thermal treatment at $200\text{ }^\circ\text{C}$. Partially crosslinked polyamides with high emission fluorescence were obtained. Consequently amide bond formation, crosslinking and conjugation are the main factors that influence the fluorescence process. While polymers have several factors that affect the fluorescence, we believe that the most significant is the crosslinking of vinyl bonds. Subsequent thermal treatment of polyamides provoked crosslinking increase and fluorescence loss. The effect of the chemical structure was correlated with the thermal decomposition. Polyamides were characterized by UV-visible, FT-IR and $^1\text{H-NMR}$ spectroscopy, inherent viscosity and thermogravimetric analysis (TGA). The synthesized polyamides exhibited potential for heat sensitive devices application since the fluorescence can be activated or quenched according to a heating process.