Iron (III) Functionalized of PMMA-co-PMAA produced by electrospinning

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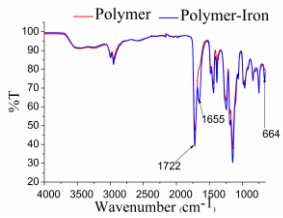
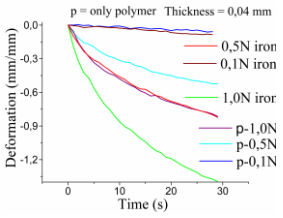
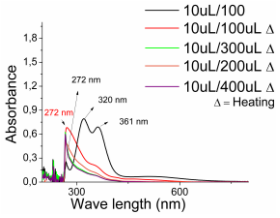
Electrospinning is a versatile technique that allows fabrication of continuous fibers with diameters down to a few nanometers.[1] This method have been applied to synthetic and natural polymers, loaded fibers with chromophores, nanoparticles, or active agents, as well as to metals and ceramics.[1] Electrospinning has been used both, academia and industry. The scope of applications, in fields as diverse as optoelectronics, sensor technology, catalysis, filtration, and medicine, is very broad.[2] Herein, electrospinning was used to produce polymer fibers with nanometer diameters functionaliezed with iron (III). Polymer solution Poly(methyl methacrylate-co-methacrylic acid) (PMMA-co-MAA) 14 % w/v in DMF was reacted with iron chloride (III) under heating (70 ^{o}C) and stirring for 3 hours to produce fibers with iron coordinated into polymer structure. Reacted solution was directly electrospun and the parameters used to produce the fibers were: voltage 11 kV, flow rate of 2,5 mL.h^{-1} and 27 cm (distance from the capilar to the collector plate). Infrared spectroscopy analysis (FTIR-ATR) showed a new band at 1650 cm^{-1} (fig a), Thermomechanical analysis (fig b) showed that the fiber with iron had a better tenacity under 0,1, 0,5 and 1,0 N. Interaction iron-carbonyl was detected by absorption spectrum (UV-Vis), (fig c). Contact angle (fig d) demonstrated a higher hidrofobicity of the fiber functionalized with iron.



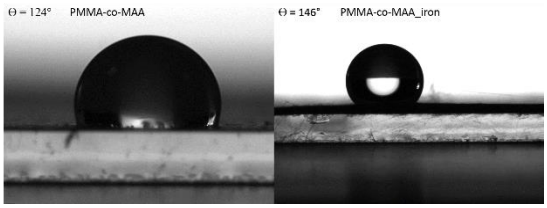
a) FTIR-ATR spectra of polymer and polymer/iron.



b) TMA analysis of polymer and polymer/iron.



c) UV-Vis spectra of iron chloride and polymer/iron at crescent ratios.



d) Water contact angle of fibers without and with iron chloride.

[1] GREINER, A.; WENDORFF, J. H. E *Angew. Chem. Int*. **2007**, *46*, 5670.

[2] KUNDU, S. C. BHARDWAJ, N. *Biotechnology Advances.* **2010**, *28*, 325.