Electrochromic Properties of Nanostructured Materials Based on Polyaniline, Chitosan and Organically Modified Clay

Propriedades Eletrocrômicas de Materiais Nanoestruturados Baseados em Polianilina, Quitosana e Argila Organicamente Modificada

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Abstract: The development of hybrid materials based on conjugated polymers have afforded materials with excellent characteristics for application in optoelectronic devices. Polyaniline (PAni) has been widely investigated due to its advantages, including high optical contrast, environmental stability, easy synthesis, as well as comparatively low cost [1]. It has been sought to improve such properties through the preparation of blends based on PAni with other appropriate polymers, such as polystyrene, cellulose, starch and chitosan, or composites by the incorporation of metal oxides, montmorillonite clays or mesoporous materials. However, blending of PAni and non-conductive polymers usually decreases the conductivity of the material leading to a loss in their electrochromic response. Thus, clays are a good choice to prepare nanostructured PAni composites aiming to enhance its electrochemical and optical properties due to the possibility of PAni intercalation inside the lamellae of the clay that can lead to a better alignment of the polymer backbone, improving its conductivity. It was observed that for the PAni-chitosan sample a chemical linkage occurs between PAni and chitosan, with formation of a copolymer, on the other hand, the mixture of PAni, chitosan and clay leads to a phase separation between the PAni-clay and chitosan, affording an immiscible blend [2], Figure 1. The presence of chitosan and clay in the PAni affords hybrid materials that present different structures and properties as compared with its individual constituents (PAni, chitosan, and clay) or its constituents combined in pairs (PAni-clay, PAni-chitosan).

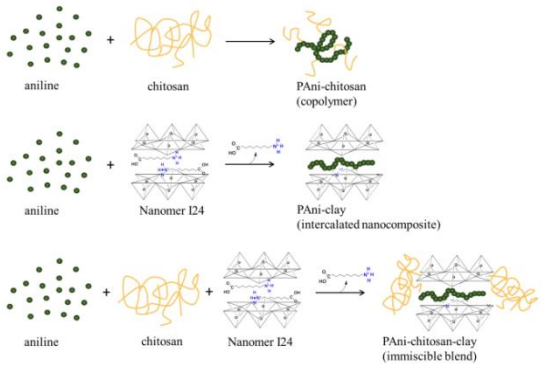

Figure 1. Schematic representation of the interaction between PAni, chitosan and clay for each hybrid material: PAni-chitosan, PAni-clay and PAni-chitosan-clay.

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References:

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[2] R. C. Silva, M. V. Sarmento, F. A. R. Nogueira, J.Tonholo, R. J. Mortimer, R. Faez, A. S. Ribeiro, *RSC Adv.* 4 (2014) 14948-14955

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