# Characterization of chemically synthesized nanocomposites obtained by methylpyrrole and/or pyrrole with $ZrO_2$ nanopowder

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The polypyrrole/$ZrO_2$ (PP/$ZrO_2$), poly(methylpyrrole)/$ZrO_2$ (PMP/$ZrO_2$) and poly(methylpyrrole-co-pyrrole)/$ZrO_2$ (poly(MP-co-P)/$ZrO_2$) nanocomposites has been successfully prepared via a facile chemical polymerization method. Nanopowders ($ZrO_2$) were successfully coated with polymer through 'in-situ' chemical oxidative polymerization of pyrrole according to the procedure described elsewhere [1, 2]. X-ray diffraction analysis provides structural information. The pattern of nanocomposites (PP/$ZrO_2$, PMP/$ZrO_2$ and poly(MP-co-P)/$ZrO_2$) shows the corresponding broad peak with polymer and nanopowders. UV-vis and FTIR studies showed that the $ZrO_2$ particles affect the quinoid units along the polymer backbone and indicate strong interactions between $ZrO_2$and quinoidal sites of organic material. The thermal degradation behavior of polymer in the nanocomposites has been investigated by thermogravimetric analysis. The weight loss suggests that the polymer chains in the nanocomposites are more thermally stable than pristine polymer. The electrochemical behavior of the polymers extracted from the nanocomposites has been studied by cyclic voltammetry. Good electrochemical response has been observed for polymer grown into nanoparticles, the redox processes indicates that the polymer obtained in these conditions is electroactive.

**Bibliography:**

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