

The Preparation and Characterization of Conductive Poly(O-Toluidine)/Smectite Clay Nanocomposite

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Abstract : Smectite is a layered silicate and modified with alkyl ammonium salts to make both the hydrophilic silicate surfaces organophilic, and to expand the clay layers. Thus, a nanocomposite structure can be formed enabling to enter various types of polymers between the layers. In this study, Na-smectite crystals were prepared by purification of bentonite. Benzyltributylammonium bromide (BTBAB) was used as a swelling agent. The mixing time and additive concentration were changed during the swelling process. It was determined that the 4 h of mixing time and 0.2 g of BTBAB were sufficient and the usage of higher amounts of salt did not increase the interlayer space between the clay layers. Then, the conductive poly(o-toluidine) (POT)/smectite nanocomposite was prepared in the presence of swollen Na-smectite using ammonium persulfate (APS) as oxidant in aqueous acidic medium. The POT content and conductivity of the prepared nanocomposite were systematically investigated as a function of polymerization conditions such as the treatment time of swollen smectite in monomer solution and o-toluidine/APS mol ratio. The POT content and conductivity of nanocomposite increased with increasing monomer/oxidant mol ratio up to 1 and did not change at higher ratios. The maximum polymer yield and the highest conductivity value of the composite were 26.0% and 4.0×10^{-5} S/cm, respectively. The structural and morphological analyses of the POT/smectite nanocomposite were carried out by XRD, FTIR and SEM techniques, respectively.

Keywords : clay, composite, conducting polymer, poly(o-anisidine)

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020