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Raman, morphology and electrical behavior of nanocomposites based on PEO/PVDF with multi-walled carbon nanotubes

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Abstract

In this work, FT-IR, Raman, TEM spectroscopy and AC conductivity were used to study and characterize of PEO/PVDF blend incorporated with low content of multi-walled carbon nanotubes (MWCNTs). Main characteristics of IR and Raman bands for the two polymers and MWCNTs were observed. The shift of G, D and G' bands of MWCNTs occurred. All results showed that MWNTs-COOH were covalently linked with the blend through OH and C-C bonds. TEM images illustrated that MWNTs were well dispersed into polymeric matrices and wrapped with PEO/PVDF chains. The temperature dependent conductivity measurements of nanocomposites were studied. The addition of MWCNTs increases and enhances the conductivity attributed to charge carrier build up and increases in segmental mobility of polymeric chains. Molecules in the loaded samples begin to bridge the gap which separates them by lowering potential barriers and the localized state between them. Values of both ϵ' and ϵ'' are high at lower frequency and decrease with an increase of frequencies due to polarization effects. (C) 2015 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keywords

Author Keywords: MWCNTs; Nanocomposites; Raman spectroscopy; TEM; AC conductivity**KeyWords Plus:** POLY(VINYLIDENE FLUORIDE); POLYMER ELECTROLYTES; POLY(ETHYLENE OXIDE); PVDF FILMS; SPECTROSCOPY; BLENDS; CONDUCTIVITY; MISCIBILITY

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