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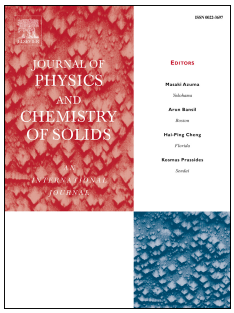

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Izadyar Ebrahimi, Mazeyar Parvinzadeh Gashti

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Polypyrrole-MWCNT-Ag composites for electromagnetic shielding: Comparison between chemical deposition and UV-reduction approaches

Izadyar Ebrahimi[1], Mazeyar Parvinzadeh Gashti[2*]

1- Young Researchers and Elites Club, Yadegar-e-Imam Khomeini (RAH) Shahre Rey Branch, Islamic Azad University, Tehran, Iran

2- Research and Development Laboratory, PRE Labs Inc., 3302 Appaloosa Road, Unit 3 Kelowna, British Columbia, V1V 2W5, Canada

*E-mail address: mparvinzadeh@gmail.com (M. Parvinzadeh Gashti)

Tel/fax: +1 (877) 435-7360

Abstract

In this study, we focused on the synthesis of polypyrrole-MWCNT-Ag composites and we evaluated their electrical properties to determine the electromagnetic interference shielding performance. We reduced silver nanoparticles in composites using two different *in situ* methods: UV-reduction and chemical deposition. Composites were characterized using spectroscopic and microscopic tools for evaluation of the chemical, morphological, electrical conductivity and electromagnetic shielding effectiveness. Results from Fourier transform infrared spectroscopy and dispersive Raman microscope showed chemical interactions between silver and the polypyrrole-MWCNT composite due to the charge-transfer within the structure. X-ray diffraction confirmed appearance of two new peaks for silver nanoparticles embedded in polypyrrole-MWCNT independent to reduction method. According to microscopy images, silver nanoparticles were homogenously distributed at the PPy-MWCNTs interfaces by UV reduction, while, chemical reduction resulted to deposition of silver within the PPy matrix. Finally, our results revealed that the polypyrrole-MWCNT-Ag composite produced via UV-reduction has higher electrical conductivity and shielding effectiveness in comparison to chemically reduced one.

Keywords: Composite materials; Electronic properties; X-ray diffraction; Chemical synthesis.