Structural and Electrical Properties of PVA/PVP Blend Doped with Methylene Blue Dye

H. M. Zidan¹, N. A. El-Ghamaz¹, A. M. Abdelghany², A. Lotfy^{3,*}

¹ Physics Department, Faculty of Science, Damietta University. P.O.Box 34517, New Damietta, Egypt.

² Spectroscopy Department, Physics Division, National Research Center, 33 ElBehouth St., Dokki, 12311, Cairo, Egypt.

³ Department of Basic Science, Higher Institute of Engineering and Technology, New Damietta, Egypt.

* E-mail: ahmedwaves20@yahoo.com

doi: 10.20964/2016.11.08

Received: 19 July 2016 / *Accepted:* 6 September 2016 / *Published:* 10 October 2016

Films of PVA/PVP blend (1:1) doped with different levels of methylene blue dye (MB) were prepared using the casting technique. X-ray, IR, DC and AC analyses were used to give more information about structural variation that arises due to different doping levels. Semi-crystalline nature of PVA/PVP blend revealed from X-ray diffraction pattern. The crystallinity of the doped blends decays as the doping level of MB increases. The IR analysis showed that a presence of double bond segments which are assumed as an appropriate sites for polarons and/or bipolarons. The dependence of the DC electrical conduction on the temperature was ascribed in view of phonon–assisted interpolaron one–dimensional hopping of charge carriers. Dielectric analysis showed that the values of ϵ_r decrease with increasing frequency and becomes constant at higher frequencies. On the other hand, ϵ_r increases with the temperature. The σ_{ac} values increase with increasing the frequency as well as MB content. The values of the frequency exponent S designate that quantum mechanical tunneling mechanism (QMT) is the dominant model within prepared samples.

Keywords: PVA/PVP blend; XRD; FTIR; electrical conductivity.

[FULL TEXT](#)

© 2016 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).