

10

## Effect of Cobalt Chloride as filler and PVP on the Optical Properties of PVA /PEG / PVP Blends\*

© R.M. Ahmed, A.A. Ibrahim, and E.A. El-Said

Physics Department, Faculty of Science, Zagazig University,  
44519 Zagazig, Egypt

e-mail: rania.7.8.2016@gmail.com

Received November 08, 2019

Revised December 18, 2019

Accepted January 31, 2019

Different concentrations of PVA/PEG/PVP blends as well as different composites of cobalt chloride, as filler, embedded in a polymeric blend as a hosting matrix, were prepared by solution casting method. The samples were characterized by a powerful technique as X-ray diffraction (XRD) which shows that the value of crystallite sizes ( $D$ ) was mainly depending on the content of both of PVP and cobalt chloride ( $\text{CoCl}_2$ ). The studying of the optical properties for the samples was investigated through understanding the obtained results of the absorption and reflection measurements. The absorption spectrum was increasing with increasing each of PVP content in PVA/PEG/PVP blends and the filler content in all the composites of  $\text{CoCl}_2$ / PVA/PEG/PVP. Also, the concentrations of PVP and  $\text{CoCl}_2$  had an influence on the magnitude of the calculated values of the static dielectric constants ( $\epsilon_\infty$ ), the static refractive index ( $n_o$ ), the moments of the optical spectrum ( $M_1$  and  $M_3$ ), the average interband oscillator wavelength ( $\lambda_o$ ) and the oscillator length strength ( $S_o$ ). The estimated values of both of the oscillator energy gap  $E_o$ , and the dispersion energy  $E_d$ , were decreasing by increasing the content of  $\text{CoCl}_2$  in the composites  $\text{CoCl}_2$ /PVA/PEG/PVP 72/5/23 wt.%.

**Keywords:** refractive index, optical band gap, Urbach energy, polymer blends, cobalt chloride.

---

\* Полный текст статьи опубликован в „Optics and Spectroscopy“  
V. 128 N 5 2020.