

Effect of Gel Concentration on Physical Properties of an Electrochromic Device

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Abstract : In this work, we present an exclusive study on the effect of the feeding ratio of polyaniline-based redox-active gel layer on electrical and optical properties of innovative electrochromic devices (ECs). An electrochromic device consisting of polyaniline (PANI) has a redox-active gel electrolyte placed between two conducting transparent fluorine-doped tin oxide glass substrates. The redox-active composite gel is a mixture of different concentrations of aniline (monomer), a water-soluble polymer poly (vinyl alcohol), hydrochloric acid, and an oxidant. The EC device shows the color change from dark green to transparent for the applied potential between -0.5 V to +2.0 V. The coloration and decoloration of the ECs were tested for electrochemical behavior using techniques such as cyclic voltammetry (CV), chronoamperometry (CA), and electrochemical impedance spectroscopy (EIS). The optical transparency of the EC devices was examined at two different biasing voltage conditions under UV-visible spectroscopic technique; the result showed 65% transmittance at 564 nm and zero transmittance when the cell was biased at 0.0 V and 2.0 V, the synthesized mol fraction gel was analyzed for surface morphology and structural properties by scanning electron microscopy and Fourier transformer spectroscopy.

Keywords : electrochromic, gel electrolyte, polyaniline, conducting polymer

Conference Title : ICAOEM 2021 : International Conference on Advances in Organic Electrochromic Materials

Conference Location : Montreal, Canada

Conference Dates : May 24-25, 2021