

Synthesis and Characterization of a Novel Electrochromic Copolymer via Electrochemical Techniques

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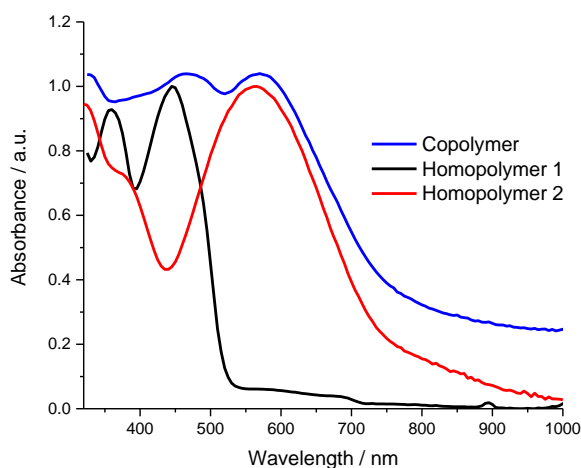
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Abstract- Electrochromic polymers are conjugated systems that have an ability to change their colors upon applied potential. These systems are potential candidates in various technological applications such as organic solar cells, light emitting diodes, smart displays and electrochromic windows. In this study, two conjugated compounds were used to make an electrochromic copolymer. The copolymer was prepared via electrochemical techniques and electrochemical and optical properties of the resulting copolymer were reported.

The aim of this study is to approach to black color in the resulting copolymer. Color black is important especially for solar cell applications due to harvesting more sunlight. A 3,4-propylenedioxythiophene-carbazole based (monomer 1) and a thiophene-benzothiadiazole based (monomer 2) compounds were selected for copolymerization, since the maximum of their optical absorption bands are at 355 nm and 455 nm, respectively. Moreover, the homopolymer 1 changes its orangish color to blue upon doping and the homopolymer 2 changes its violet color to blue upon doping.



The copolymer synthesized in this study exhibits brownish-black color in its neutral state and blue upon doping. The optical absorption gives two maximum at 455 nm and 560 nm (coming from homopolymer 1 and homopolymer 2, respectively), with a corresponding band gap of 1.65 eV.

All the electrochemical and optical properties of the two monomers, their homopolymers and the copolymer were reported and discussed.

Keywords- Electrochromic polymers, conjugated systems, electrochemistry.