The Synthesis of Thiophene Derived Conductive Copolymer and the Analysis of the Properties of Electrochromic Devices

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Electrochromism is a reversible change which can be observed through oxidation or degradation by electrochromical method. Electrochromic devices are rechargeable batteries. In this system, there are electrochromic electrode, counter electrode and between them there is electrolyte which can be both liquid or solid. The color change is implemented by the potential difference between the electrodes. Electrochromic devices should be designed as sustainable and reusable without any decrease in it's activity and performance. The design of electrochromic devices are important both economically and industrially. The purpose of this study is to synthesize a copolymer which was composed with thiosemicarbazone monomer and thiophene by electrochemical ways and to study the electrocromic properties of synthesized coplymers. The synthesis of the polymer is both easy and cheap. In this study, I synthesized a copolymer with electrochemical techniques, which was composed with thiosemicarbazone and which is not seen in literature. I characterised the conductive polymer that I synthetised; with FTIR,NMR,UV-Vis-NIR, CV tecniques. The transition of the synthesized copolymer was found as 4,3.10-4 S/cm by 4 point measurement technique. When the voltage of the electrochromic device that I produced is increased from 0.0 to +2.0 V , I observed a colour change from brown to blue. I carried out a kinetic study and I found the optical contrast %26 in 650 nm and the reaction time was less than a second. In addition, between 0.0 V and 2.0 V I observed colour stability until 1000 cycle. In this respect, the electronic device has been improved and future studies on creating an electrocromic device can be done in further stages.

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