EVALUATION OF ELECTROCHROMIC PROPERTIES OF POLYPYRROLE FILMS MODIFIED BY PHENOTHIAZINE DERIVATIVES

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Electrochromism is the phenomenon, where the color of a material changes by applying a voltage [1]. This feature is very important for a wide range of materials such as smart windows, screens, thermal modulators and others [1]. Electrochromic properties are characteristic for some metal oxides and also some organic materials such as polymers too [2]. Polymers have a wide range of possibilities for both synthesis and application, and therefore can be used in the production of electrochromic materials [3]. Moreover, polymerization may involve phenothiazine derivatives that are biologically active [4]. Phenothiazine derivatives can be combined with other polymers, for instance pyrrole, in order to create electrochromic films with better properties [5, 6].

The aim of this research was to investigate three different syntheses of films based on polypyrrole and three phenothiazine derivatives - methylene blue, azure A, thionine. The conditions of these films where investigated and analyzed by different methods. Films were synthesized on indium tin oxide coated glass electrode by cyclic voltammetry (CV) method at scan rate of 50 mV/s between −0,2 and +1 V for 25 cycles, step potential 2,44 mV. The obtained films were analyzed by cyclic voltamperometry, chronamperometry, AFM methods. The surface morphology of the coatings was determined by AFM and it was found that the thickness of the surface irregularities ranges from 1 to 3 μm. The investigated polymeric coatings exhibited electrochromic properties (color change in different media), reacted to pH changes, ascorbic acid concentration. It is contemplated that coatings of pyrrole and methylene blue or thionine may also be used for ascorbic acid detection.

References

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