

Abstract

Evaluation of the Electrochromic Response of Polypyrrole in the Presence of CO₂ in the Solution †

Vilma Ratautaite ^{1,*}, Gintautas Bagdžiūnas ¹, Ernestas Brazys ², Almira Ramanavičienė ² and Arunas Ramanavicius ³

¹ Laboratory of Nanotechnology, Department of Functional Materials and Electronics, Center for Physical Sciences and Technology, Sauletekio av. 3, Vilnius LT-10257, Lithuania

² Institute of Chemistry, Department of Physical Chemistry, Vilnius University, Naugarduko 24, Vilnius LT-03225, Lithuania

³ NanoTechnas – Center of Nanotechnology and Materials Science, Institute of Chemistry, Faculty of Chemistry and Geosciences, Vilnius University, Naugarduko str. 24, Vilnius LT-03225, Lithuania

* Correspondence: vilma.ratautaite@ftmc.lt

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Abstract: The indium tin oxide (ITO) coated glass was used as a working electrode for electrochemical deposition of conducting polymer polypyrrole (Ppy). Before polymerization, the electrode surface was additionally modified with triethoxymethylsilane (TEMS) to provide better adhesion of polypyrrole to the surface of ITO. Polymerization of Ppy was performed electrochemically as it was described in a previous study. The ionic strength of the solution was supported by LiClO₄. Since the dissolved CO₂ in the solution forms the weak acid and thus the pH of a solution can be slightly changed the electrochromic response to the pH changes was evaluated. Britton–Robinson buffer (BRB) was used as the model system for evaluation of the electrochromic response of polypyrrole at different pH values and concentrations of NaHCO₃, which was a source of CO₂ in the solution. For the evaluation of electrochromic response in the presence of CO₂ the double potential step chronoamperometry method was applied and UV-Vis absorption spectra were registered. To gain insight into the charge transfer phenomenon in more detail, the cyclic voltammetry experiments at different glass/ITO(TEMS)/Ppy electrode potential sweep rates were performed.

Keywords: conductive polymer; polypyrrole (Ppy); electrochemical polymerization; electrochromic properties