Revolutionizing Ion-Selective Electrodes: An Eco-friendly Approach to Optimizing Perinone Polymer Polymerization

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Ion-selective electrodes (ISEs) are an important analytical tool for accurately determining ion concentrations in varied matrices. A key design element of these electrodes is the solid contact materials responsible for potential stability and effective charge transfer. The selection of suitable materials is still a research challenge. Previous studies focus on the use of carbon materials such as carbon nanotubes and graphene, metal nanoparticles and their oxides (e.g. CuO), composites, hybrid materials combining different functionalities, and conductive polymers such as polyaniline (PANI) [1].

This presentation presents an innovative approach using a novel perinone polymer (PPer) as a mediation layer. PPer is characterized by unique properties such as high conductivity, thermal stability, and electroactivity. The polymer layer was deposited on a glassy carbon electrode using a potentiodynamic electropolymerization method using cyclic voltammetry [2]. The polymerization process was optimized by precisely selecting experimental conditions and electrolyte salts. The study involved two modes of film deposition: under anaerobic conditions (potential range from -1.2 V to 1.4 V) and aerobic conditions (0 V to 1.4 V), using different numbers of cycles (5, 10, 20, 30). After polymerization, the films were stabilized in a monomer-free electrolyte solution (in 5 cycles). The resulting layers were subjected to comprehensive analysis using microscopy and optical profilometry. The effectiveness of the PPer layer as a solid contact material was evaluated by coating it with a potassium ion-selective membrane and carrying out tests on the stability and reversibility of the electrode potential. In addition, key analytical parameters of the electrodes were examined. The results indicate significant potential for the use of PPer in the context of the development of modern ion-selective electrodes.

Bibliography

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