An All-Solid-State Polymeric Membrane chloride ion-selective Electrode with Nanowires poly(3,4-ethylenedioxythiophene) as Solid Contact

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This paper reports the development of a novel all-solid-state polymeric membrane Cl⁻-selective electrode, based on nanowires poly(3,4-ethylenedioxythiophene) (PEDOT) as solid contact. The nanowires PEDOT films are synthesized on the glassy carbon electrode surface by electrochemical galvanostatic method in the cetyltrimethylammonium bromide aqueous solution. The electrochemical performances of nanowires PEDOT films are evaluated by cyclic voltammetry and electrochemical impedance spectroscopy, which indicate that the nanowires PEDOT have large redox capacitance and fast charge-transfer rate. This makes the PEDOT films suitable for solid contact layer of all-solid-state ion selective electrode. With the nanowires PEDOT, the all-solid-state Cl⁻-selective electrode shows a Nernstian response in the range from 1.0×10^{-4} to 1.0×10^{-1} M, and the detection limit is 1.0×10^{-5} M. The experiment results of potentiometric measurements and chronopotentiometry suggest that the electrode potential is very stable and the potential drift is significantly decreased.

Keywords: Chloride quantification, Electrochemistry, Poly(3,4-ethylenedioxythiophene), Sensor, Solid contact

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