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Layered double hydroxide membranes as phosphate sensitive electrodes

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Highly selective and sensitive phosphate sensors have been fabricated by constructing a solid membrane disk consisting of variable mixtures of aluminium powder (Al), aluminium phosphate (AlPO₄) and powdered copper (Cu). Both binary and ternary electrode systems were produced. The ternary membranes exhibit greater selectivity over a wide range of concentrations. The ternary electrode with the composition 25% AlPO₄, 25% Cu and 50% Al was selected as our preferred electrode. The ternary membrane electrodes exhibited linear potential response in the concentration range of 1.0×10^{-1} to 1.0×10^{-6} mol.L⁻¹. The mechanism for the selectivity of phosphates by the electrodes includes adsorption, absorption and ion exchange processes. An understanding of these processes reveals that the composition of the membrane material and its molecular structural framework are all important. The layered double hydroxides which form within the interstitial layers of the phosphate selective membranes contribute to the selectivity of the ions.

Biography

Martin Emeka Enemchukwu has completed his PhD in Chemistry from University of South Africa. He is currently a Lecturer and the Science Foundation Coordinator in UNISA. In his current position, he has helped UNISA kick start a foundation provision programme that supports students academically in the science degrees and diplomas. He has co-authored more than 5 papers in reputed journals. He is the Founding Member of the Ecotoxicology Research Niche Area (RNA) being hosted by the Chemistry Department of the same university. His research area focuses on the effective fabrication and use of ion selective electrodes in the monitoring of harmful chemical pollutants in our environment.

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