DESIGN AND APPLICATIONS OF CHEMFETS BASED ON BULK CATION-EXCHANGE MEMBRANES

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The use of a new type of ion selective membranes with the ability for bulk ion partitioning, in conjunction with ion selective field-effect transistors (ISFETs) allows for the development of electrochemical microsensors (CHEMFETs) based on an original response mechanism. The ion-partitioning membrane incorporates two different ionophores, one selective to protons and the other to analyte cations, as well as the necessary anionic lipophilic sites. As dictated by the electroneutrality principle, when the concentration of the analyte cations in the sample increases (for example potassium), K^+ is extracted into the membrane phase displacing protons of equal charge out of the membrane. The pH-sensitive gate of an ISFET or the surface of a glass pH electrode is used as an internal transducer for the monitoring of the membrane proton flux. The resulting signal of the pH transducer is related to the concentration of the analyte cation present in the sample. The results presented in this lecture will show the analytical characteristics of this new type of sensors for single and doubly charged cations, as well as possible applications in environmental and clinical chemical analysis.