

Short Communication

Development of an Electrochemical Sensor for Chloride ion Detection Using Ion-Sensitive Field-Effect Transistor Array

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In this study, we designed a p-channel 32×48 ion-sensitive field-effect transistor (ISFET) array sensor with a modified membrane to detect chloride ion concentration. The proposed sensor includes three parts, i.e., an ISFET array, readout interfacing circuits, and row/column selection circuits. The unmodified ISFET array sensor was immersed in solutions with pH ranging from 2.88 to 10.40, and the sensing characteristics were evaluated. A high sensing average sensitivity (55.6 mV/pH) and linearity (0.945) were demonstrated. Then, a chloride ion-sensing membrane was dropped on the floating gate of the ISFET sensor. To evaluate the sensing characteristics of the chloride ion sensor, the sensor was immersed in different concentrations of NaCl solutions ranging from 10^{-5} M to 10^{-1} M. The average sensitivity and linearity of the chloride ion sensor were 51.8 mV/pCl and 0.990, respectively.

Keywords: chloride ion sensor, ion-sensitive field-effect transistor, ion sensing membrane, electrochemical.

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