

Calcium-Selective Electrodes Based on an Urushi Matrix Membrane and Its Application to FET Sensors

Shin-ichi Wakida, Masataka Yamane and Kazuo Hiiro

Government Industrial Research Institute, Osaka,
Midorigaoka 1-8-31, Ikeda, Osaka, 563, Japan

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A calcium ion-selective electrode (ISE) based on an Urushi matrix membrane was investigated. The calcium ion-sensitive membrane was composed of calcium ionophore, *o*-nitrophenyloctylether, sodium tetraphenylborate and Urushi. The prepared Urushi ISE showed a linear response in the calcium ion activity range from $10^{-5.5}$ M to $10^{-1.5}$ M with about 25 mV of potential change per decade of activity and excellent durability for over two months. It indicates that the Urushi matrix membrane is superior to the corresponding polyvinyl chloride (PVC) matrix membrane in terms of durability.

For its application to the FET sensor, the Urushi ion-selective field-effect transistor (ISFET) was prepared. The Urushi ISFET showed a linear response in the $10^{-5.5}$ – $10^{-1.5}$ M range with a slope of about 25 mV per decade of activity. The selectivity of the Urushi matrix ISFET was almost the same as that of the corresponding PVC matrix ISE. The Urushi ISFET showed excellent durability, indicating that the Urushi matrix membrane adheres strongly to the device.

1. Introduction

Recently, various kinds of chemical sensors sensitive to chemical species have been investigated. Ion-selective electrodes (ISEs) and ion-selective field-effect transistors (ISFETs) are known as ion sensors. A number of methods for the fabrication of the ion-sensing membrane on the ISFET device have been proposed.⁽¹⁾ The fabrication methods are classified into dry or wet processes. In making a calcium ISFET, as no inorganic calcium ion-sensing material usable in the dry process has