

High-Sensitivity Membranes of Light Addressable Potentiometric Sensor for Penicillin Detection

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In this study, light addressable potentiometric sensors (LAPSs) that have devices with Si₃N₄/SiO₂/Si and Ta₂O₅/SiO₂/Si structures were fabricated. We investigated the response characteristics of penicillin and evaluated the possible application to a bioimage sensor using the fabricated LAPSs. Penicillinase was immobilized on the devices to hydrolyze the penicillin using the self-assembled monolayer (SAM) method. Then, the response characteristics according to the concentration of the penicillin were measured and compared. The measuring system made up of parts such as a potentiostat, signal processing parts, and an xyz stage controlling part was simplified using LabVIEW. As a result of the enzyme reaction, the sensitivity of the sensor that has a Si₃N₄ surface was 60 mV/decade and 74 mV/decade which has a Ta₂O₅ surface in the penicillin concentration range of 0.1–10 mM. Also, we could obtain an image of with a resolution of 128 × 128 pixels within a 1 × 1 cm sensing area.

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