Preparation of Phosphate-Binding-Protein-Modified Electrode and Its Application to Reagentless Phosphate Sensor

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To develop a simple and reagentless phosphate sensing system, phosphate binding protein (PBP) was utilized as a recognition element for the sensor. The preparation of a PBP-modified electrode was investigated. PBP was immobilized on a gold electrode surface through cysteamine and glutaraldehyde. The amount of immobilized PBP was 13.7 ng/mm², which corresponded to three layers of PBP. The response of the PBP-modified electrode to phosphate was measured as the potential change of the electrode and the response time was about 2 min. The response to phosphate was –0.505 mV/mM in the concentration range of 10–50 mM of phosphate. To evaluate the nonspecific response to ions other than phosphate, a malic-dehydrogenase-immobilized electrode was compared with the PBP-modified electrode. The response to phosphate of the PBP-modified electrode was specific but those to other ions were almost same as those of the malic-dehydrogenase-modified electrode.

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