

## Information Transduction in Slime Molds and Its Application to Biosensing

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Responses of slime molds, the lowest eukaryotes, to chemical compounds were investigated from the standpoints of respiration activity and protoplasmic streaming. On the basis of this information on transduction functions of slime molds, biosensors for environmental monitoring were developed. Slime mold sensors based on respiration activity change could be applied to the measurement of biochemical oxygen demand (BOD) and toxic compounds. As another biosensing index of slime molds, periodic behavior of protoplasmic streaming was investigated. The period of protoplasmic streaming was changed by the addition of chemical compounds. This phenomenon could also be applied to toxic compound monitoring.

### 1. Introduction

Organisms show various responses to changes in environmental factors such as pH, temperature, chemical composition and light intensity. These phenomena are thought to show information transduction in cells. Such information transduction in cells can be applied to biosensor development.<sup>(1-3)</sup> For example, by measuring responses of organisms to chemical compounds, we could determine amounts of environmental pollutants such as toxic compounds, and biochemical oxygen demand (BOD).

Among the various responses of organisms, respiration activity change is the most common and useful activity index. Various kinds of microbial sensors based on the measurement of respiration activity changes have been reported.<sup>(1-3)</sup> With the combination of a microorganism-immobilized membrane and Clark-type oxygen electrode, microbial