

Highly Robust and Sensitive Glucose Biotransistor Using Bioenzyme-Functionalized Polymer

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Biosensors based on polymer semiconductors have the great attention because their delocalized electrons can be affected by localized stimuli, resulting in the alteration of the whole charge state. In this regard, higher sensitivity can be developed for even tiny amount of analytes than other materials. However, the biosensors are stuck in limitation due to weak chemical and physical properties of polymer semiconductors, indicating that they are vulnerable to solvents of analytes and difficult to introduce sensing moieties owing to no binding site on the surface. Herein, in order to break through these limitations for biosensor, we present polymer semiconductor gel (PSG) which has chemical endurance for any solvents and dangling Si-OH of the surface, thereby enabling surface functionalization with straightforward solution process. Using this PSG, we achieved non-invasive type glucose sensing biotransistor functionalized by glucose oxidase with simple sequence solution processes. The biotransistor not only detected low conc. of glucose (below 5mM) which is the same amount of glucose in sweat, but also showed high operation stability in aqueous environment.