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All organic triboelectric generator for a self-powered glucose sensor based on an organic electrochemical transistor

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All-organic triboelectric generator (AO-TEG) was explored as a power supplier for a self-powered glucose sensor based on organic electrochemical transistor structure. The AO-TEG showed high voltage (>700 V), high current density (>50 mA/m^2) and high power density (>12.9 W/m^2) with high stability which comes from the good adhesion of the conducting polymer on dielectric polymer film. Through the management circuit and voltage regulator, the AO-TEG could be demonstrated as a sustainable power source for a glucose sensor. We also introduced the conducting polymer as a glucose sensor using organic electrochemical transistor (OECT) structure. With the redox enzyme glucose oxidase (GOx), glucose was oxidized to the hydrogen peroxide and D-glucono-δ-lactone, and the hydrogen peroxide, subsequently, hydrogen peroxide was oxidized to oxygen and two protons, because of these reaction, the conducting polymer was oxidized, and both the color and the current were significantly changed. These results showed the glucose sensor using the OECT structure could provide dual-detection methods. Futhermore, the detection range and the sensitivity of the sensor could be tuned by adjusting the gate bias. Further analysis on the sensitivity and detection method, and application potential of this method will be discussed in the presentation.

Biography

Younghoon Kim is Integrated Doctoral course student in Prof. Eunkyoung Kim's Lab in Yonsei University. His major research area is the application of conducting polymer materials on energy and biomedical applications.

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