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Evaluation of Immunoglobulin Sensing Function Using a Fullerene-Composite-Polymer-Coated Sensor Electrode

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The detection of antigen-antibody reactions in normal saline solution measured using a chip-mounted source-drain electrode coated with a fullerene composite polymer layer containing an immobilized immunoglobulin G (IgG) molecule was investigated as a function of anti-IgG concentration. Five pairs of source-drain electrodes (5 wells) were fabricated on a glass substrate (16 mm × 40 mm), in which the individual Au/Cr (1.0/0.1 μm thickness) sensors had widths of 0.5 mm and an interelectrode interval of 1.5 mm. The fabricated source-drain electrodes were further coated with an insulation layer comprising porous materials for use as an adsorbent for receiving IgG molecules. The sensor chip was equipped with a sensor signal analyzer that comprised either an amplifier circuit with a Miniship™ or a system in a packaged large-scale integration (LSI) device. Accuracy, as well as reproducibility for the detection of anti-IgG, was improved by the addition of fullerene to the insulation layer, which had a correlation coefficient for the calibration curve of 0.83–0.88, whereas a fullerene-free insulation layer had a low correlation coefficient between 0.16–0.38.

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