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Chemical modification and its evaluation of CNT-based bio-nanosensor by plasma activation technique T. HIRATA, S. AMIYA, M. AKIYA, Dept. of Biomed. Eng., Musashi Inst. of Technol., O. TAKEI, Saitama Small Enterprise Prom. Corp., T. SAKAI, Saitama Univ., T. NAKAMURA, J. TOTAKE, T. YAMAMOTO, Univ.of Tokyo, R. HATAKEYAMA, Tohoku Univ. — In order to chemically modify single-walled carbon nanotubes (SWCNTs), plasma ion irradiation (plasma activation) is demonstrated on a bio-nanosensor based on poly[ethylene glycol]-grafted SWCNTs (PEG-SWCNTs) network. The PEG-SWNTs network is placed between the electrodes in the sensor-chip using a micropipet. The experimental apparatus for the plasma-activation is a magnetron-type plasma generater. The gas used for the production of carboxyl (COOH) groups in order to the immobilization of living body materials such as antibody or DNA is atmospheric air. PEG-SWNTs are synthesized by azo-PEG (initiators). According to the XPS analysis, peaks which correspond to COOH groups are observed, the ratio of the COOH peak to all peak areas has increased to 34 times that before ion irradiation. In addition, evaluation of the bio-nanosensor for a characteristic response to bovine serum albumin (BSA) [or oligonucleotides] revealed an increase in impedance between the electrodes due to BSA/anti-BSA binding (or oligonucleotides hybridization) after injection. The results of this study indicate that this bio-nanosensor reacts with a quick response time (ca. 60 s).

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