

NT-P001

Carbon Nanotubes Multi Electrodes Array to Image Capacitance for Label-free Discrimination of Lipid Region in Atherosclerosis ex vivo

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Recently, there are a lot of diseases all around the world. Out of them, Atherosclerosis (AS) is the most common cause of stroke, cardiovascular mortality, and myocardial infarction. The macrophage-derived foam cell, which is formed by oxidized low-density lipoprotein (oxLDL), is the crucial marker for AS. In this study, we report a label-free capacitance imaging technique with multi-electrode array (MEA). The lipid-rich aorta arch lesions, which are derived from an apolipoprotein-E receptor-deficient (apoE^{-/-}) mouse, exhibit higher capacitance than the lipid-free aorta arch, allowing the capacitance imaging of lipid region in atherosclerosis. To improve the contacts between MEA and tissue, polypyrrole(PPy)-coated multi walled carbon nanotubes (MWNTs) multi electrode array (PPy-MWNTs-MEA) was fabricated. Compared to TiN-MEA, PPy-MWNTs-MEA yielded lower contact impedance and better capacitance images. In addition, we have also developed a flexible MEA using single walled carbon nanotubes on a PET substrate. The lipid region could be discriminated in the capacitance images of the lipid-rich aorta arch lesions measured using flexible MEA, demonstrating a feasibility of in vivo applications.

Keywords: Atherosclerosis, Capacitance Imaging, Carbon Nanotubes

NT-P002

Fabrication of Wafer-Scale Anodized Aluminum oxide(AAO)-Based capacitive biosensor

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Various nanobiosensors have been developed and extensively investigated. For their practical applications, however, the reproducibility and uniformity should be good enough and the mass-production should be possible. To fabricate anodized aluminium oxide (AAO)-based nanobiosensor on wafer scale, we have designed and constructed a wafer-scale anodizing system. 1 μm -thick-aluminum is deposited on 4 inch SiO₂/Si substrate and then anodized, resulting in uniform nanopores with an average pore diameter of about 65 nm. Furthermore, most AAO sensors constructed on this wafer provide capacitance values of 30 nF ~ 60 nF in PBS, demonstrating their uniformity.

Keywords: AAO, biosensor