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# Hydrogenated Diamond-like Carbon Thin films for Biocompatibility

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In this study, hydrogenated diamond-like carbon (DLC:H) films were deposited onto Si and glass substrates by radio frequency (RF) magnetron technique equipped with a home-made nanodiamond powder target. Methane was used as a source of hydrogen precursor gaseous ranged from 0 to 15 sccm during the deposition process. Scanning electron microscopy (SEM) images showed the cluster size increased with increasing the H content, and atomic forced microscopy (AFM) measurement showed the surface roughness of the as-deposited DLC films increased from 1.1 nm to 8.2 nm with increasing the H content into the DLC:H films. Raman spectra and X-ray photoelectron spectroscopy (XPS) were used to investigate the bonding structures of these films, and the above analysis results showed that the prepared DLC films possess relative high $sp^3$ content with C-C bonding compared with DLC:H films composed of C=C ($sp^2$) bonding. The biocompatibility tests were further investigated by the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide (MTT) assay, which were carried out using three types of cells including MG63, PC12, and Hela types. The experimental results indicated that the H-doped DLC films could help to create suitable condition of surface/adhesion combination of DLC films in the both affinity of the tested cells and electrochemical inertness in the Hank's Balanced Salt Solutions (simulating human fluids). H doping supports the attachment and growth of cells, which prevents the permeation of electrolyte solutions, thereby simultaneity improved the biocompatibility and bioinertness of the DLC films. This presented result is useful for the fabrication and encapsulation of *in vivo* devices without induced immune response in the human body. Above results exhibited an outstanding biocompatibility and bio inertness characteristics of the DLC:H films.