PO4031

# Cell-Proliferation in Nanocrystalline Carbon thin films

Manish Kumar[1], Jin Xiang Piao[1], Amjed Javid[1], Jung Heon Lee[1], Satomi Tajima[2], Masaru Hori[2], Jeon Geon Han[1]

[1]Sungkyunkwan University, Suwon, South Korea [2]Nagoya University, Nagoya, Japan

manishbharadwaj@gmail.com

Nanocrystalline carbon (nc-C) thin films offer a wide range of exceptional physical, mechanical, biomedical and tribological properties that make them scientifically very fascinating and commercially essential for numerous industrial applications. The recent bio-applications i.e. bio-sensing, tissue engineering and cell proliferation etc. are driving the fundamental research with new perspectives. Sputtering induced nc-C thin films are usually a mixture of two solid phases; the hard diamond-like phase with $sp^3$ bonds and the softer graphite-like phase with $sp^2$ bonds. By adjusting the ratio of $sp^2$ to $sp^3$ bonds in the deposited films one can obtain the desired functional properties of the films. However, for bio-applications control over surface energy and surface electrical properties are challenging when the ratio of $sp^2$ and $sp^3$ varies. Here, we present unhydrogenated and hydrogenated nc-C thin films prepared by pulsed-DC sputtering induced. The properties of plasma parameters as a function of power density, working pressure and reactive gas content are presented using the optical emission spectroscopy and ion flux measurements. The role of plasma parameters on the structural, chemical, electrical and surface proverties are presented and correlated to the bio-activity. The improved cell-proliferation activity of these films are demonstrated for L-929 fibroblast mouse and bone cells.

**Keywords**
Cell-Proliferation
nanocrystalline carbon
thin film
magnetron sputtering
surface energy