Influence of the surface roughness of graphene-based biosensing platforms for the living cells functional state monitoring

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Biosensors are devices that measures the extent of biological activity and translates it into electrical signals. A lot of interest is being put into the research and development of biosensor for the functional state monitoring of the living cells [1]. Great focus has been placed on studies related to the material's interaction with the living cells, and the development of various suitable bio-platforms. The efficacy of these platforms is strongly connected to material's 1) physical properties (elasticity, stiffness, roughness etc.), 2) morphology, thickness, macro, micro and nano topography), and 3) biochemical properties (surface charge, hydrophobicity/hydrophilicity, etc. [2]. In this work we have compared various substrates deposited with graphene and its derivative, nanometrically thin Pyrolytic carbon (PyC), for the cultivation of living cells. Experiments were done with C6 glioma cells and we discovered that PyC coating is a promising technique for controlling the cell proliferation and directional intercellular contact (Figure 1). The ease with which the nanotopography and the physical/chemical properties of the PyC films can be controlled makes it a suitable interface in the development of biosensors and 3D bioscaffolds (Figure 2).

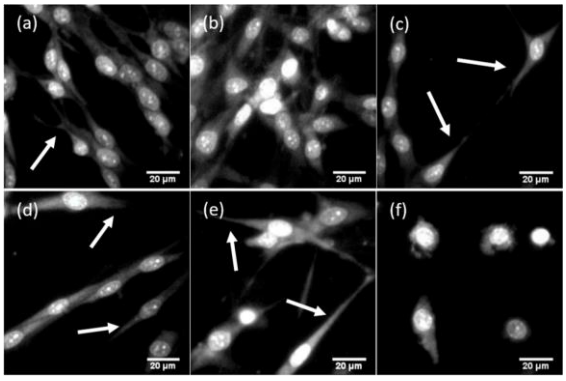

Figure 1: Glioma cells were grown on (**a**) plastic (as a control); (**b**) bSi; (**c**) PyC (20 nm) on bSi; (**d**) PyC (20 nm) on SiO_2; (**e**) PyC (40 nm) on SiO_2; (**f**) graphene nano-walls

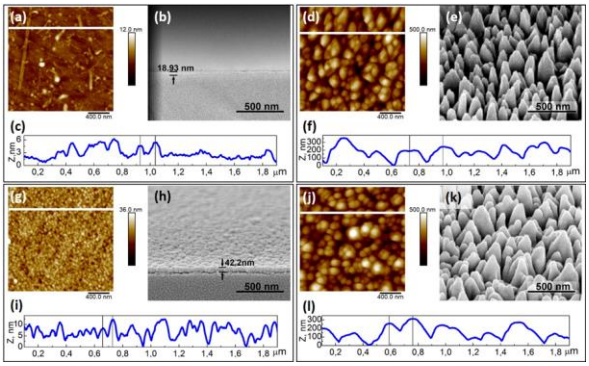

Figure 2: Typical two-dimensional AFM and SEM surface images of PyC of 20 nm (**a**,**b**) and 40 nm thickness (**g**,**h**) on SiO_2, bSi (**d**,**e**), PyC of 20 nm on bSi (**j**,**k**), respectively. The cross-sectional profiles are marked with a white line on the AFM images (**a**,**d**,**g**,**j**).

Acknowledgement

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References

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