

AFM evidences of surface modifications in MCF-7 cell line induced by MWCNT

Silvia Bistarelli^a, Simona Sennato^b, Simona Dinicola^{c,d}, Maria Grazia Masiello^{c,d}, Pierpaolo Coluccia^d, Mariano Bizzarri^e, Federico Micciulla^a, Alessandra Cucina^d, Federico Bordi^b, and Stefano Bellucci^a.

^aINFN-Laboratori Nazionali di Frascati, Frascati, 00044, Italy

^bDepartment of Physics and CNR-IPCF UOS, Sapienza University of Rome, Rome, 00185, Italy

^cDepartment of Clinical and Molecular Medicine, Sapienza University of Rome, Rome, 00161, Italy

^dDepartment of Surgery "Pietro Valdoni", Sapienza University of Rome, Rome, 00161, Italy

^eDepartment of Experimental Medicine, Sapienza University of Rome, Rome, 00161, Italy

email: silvia.bistarelli@lnf.infn.it

Keywords: AFM, MWCNT, toxicology

Since their discovery carbon nanotubes are used in many different field and medical and biological ones are one of the most importance; hence, it is critical to assess their toxicity. Treatment for 72 hours of the human breast adenocarcinoma cell line, MCF-7, with 0.1 mg/ml of Chemical Vapor Deposition produced Multiwalled carbon nanotubes (MWCNTs) containing Fe 0.55%wt, Ni 1.86%wt, has been shown in a previous work[1] to induce a moderate decrease in cell proliferation and a corresponding reduction of the percentage of cells in the S-phase of the cell cycle, as well as a moderate increase in apoptotic cells. In the present work, we examine by atomic force microscopy the physical properties deriving from incubating metal- and defect-free MWCNTs produced by arc discharge at INFN-Laboratori Nazionali di Frascati, with human colorectal, and breast cancer, as well as fibroblasts cell cultures. The biological results show no significant cytotoxicity in any of cell types examined but a changing in the wound healing have been in MCF-7 cells. We aim to explain these biological effects of MWCNTs in terms of both their cellular internalization and the cells morphological modifications (roughness) due to the contact with MWCNTs.

[1] Bellucci, S., S. Dinicola, P. Coluccia, M. Bizzarri, A. Catzone, F. Micciulla, I. Sacco, G. Ricci, and A. Cucina, 2012. Multiwalled carbon nanotubes-induced cytotoxic effects on human breast adenocarcinoma cell line. In Semiconductor Conference (CAS), 2012 International. Volume 1, 37–42.

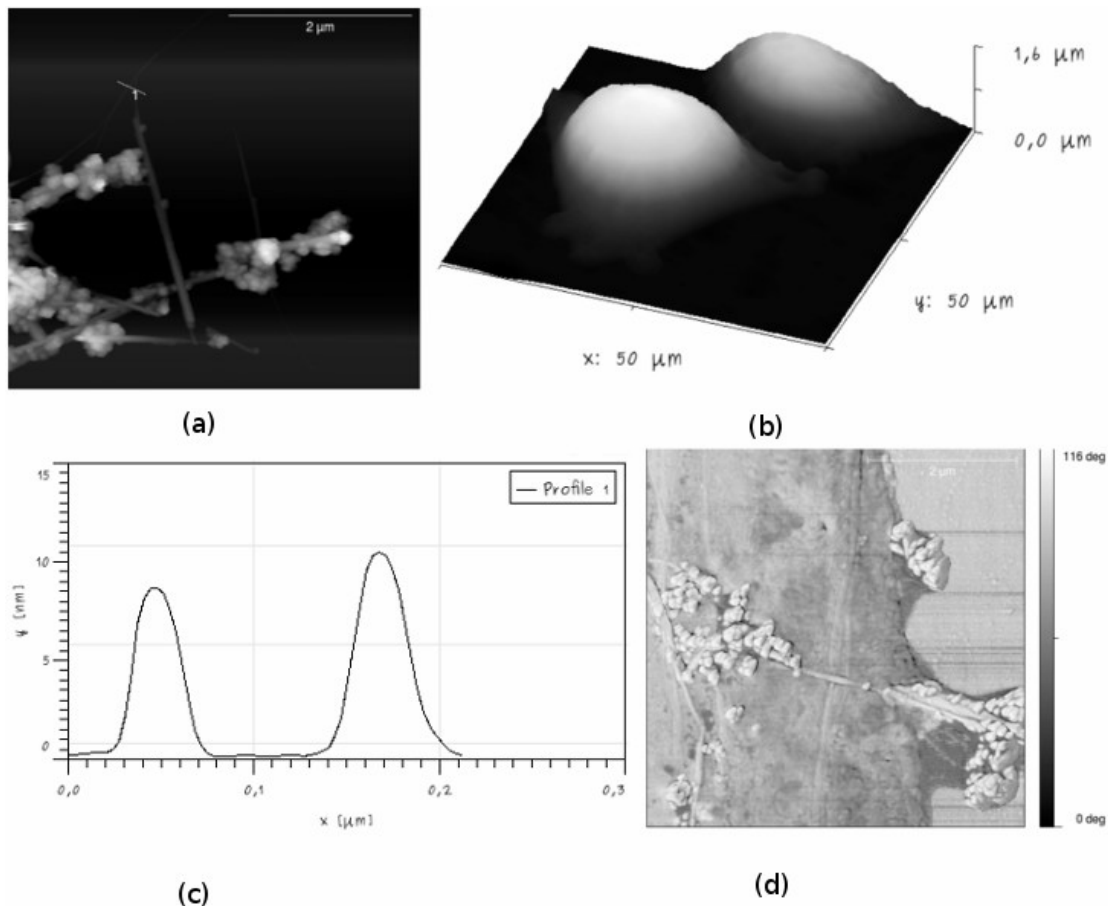


Figure 1. (a)AFM morphological image of MWCNTs, some amorphous carbon can be seen. (b)AFM 3D image of MCF-7 cell incubated with MWCNT. (c)Profile of MWCNTs obtained from first AFM image. (d)AFM phase image of surface of a MCF-7 cell after incubation. It shows a partially incubated MWCNT.