NANODIAMOND-GOLD CORE-SHELL NOVEL BIOPROBES

G. Speranza[1,4], C.L. Cheng[2], Y.-C. Lin[2], L. Minati[1], J. Hees[3], G. Lewes-Malindrakis[3], C. Nebel[3]
[1]CNR-IFN, CSMFO Lab, Via alla Cascata 56/C, 38123 Trento, Italy.
[2]Physics Dep. National Dong Hwa University, Da-Hsueh Rd., Shou-Feng, Hualien, 974 Taiwan.
[3]Fraunhofer-Institut für Angewandte Festkörperphysik IAF, Freiburg, Germany.
[4]FBK, via Sommarive 18, 38123 Trento, Italy.

Novel core-shell bio-nanoprobes enabling molecular recognition are presented in this work. These nanostructures are based on a defected diamond core and on a gold shell. Referring to the properties of the diamond core, nanodiamond possess a number of vacancies, mainly nitrogen vacancies, showing a strong emission at around 700nm when excited in the visible green region. The intense emission is coupled with high stability under light excitation which prevent any photoblitching and photoblinking effects. For this reason defected nanodiamond may be considered a promising alternative to the less stable organic dye molecules generally used in biological experiments. Besides fluorescence, the gold shell adds some other properties to the bio-nanoprobes. In particular gold provides the option to perform Raman spectroscopy.
In this work we will show preliminary results of the characterization of ND@Au nanoparticles which are appealing for bioapplications. In particular light scattering was used to determine the size distribution of the nanoparticles and their Z-potential. Scanning electron microscopy was performed to display the shape of the ND@Au while X-ray photoelectron spectroscopy allowed determining the surface chemistry of the ND nanoparticles along the process of surface engineering. Finally preliminary in vitro experiments of cells incubated with ND@Au will also be shown.