Nanodiamonds thermal probes for intracellular measurement of temperature

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The use of nanodiamonds (ND) in medicine and biology is based on their bio-compatibility in physiologic environments and very low toxicity at the intracellular level. In this regard, the precise measurement of temperature in these environments allows the better knowledge of biologic events, such as cell divisions and cell´s metabolisms alterations. Both processes are important in the pathology of cancer. A thermal nanoprobe made of ND is very plausible because their magnetic, electric and optical properties have a dependence on the temperature in the physiologic range centred at 37.5°C. In this work, we present data on the emission spectra of fluorescent nanodiamonds (FNDs), and we study its behaviour when the temperature changes with a phenomenological model. Here, the FNDs are in solution, and the model included the contributions from the background and spurious luminescent processes associated with impurities or contamination. We obtained the thermometric scales from changes of intensity, semi-width and shift position related to Zero-Phonon Lines of N-V centre with low errors and great precision. The incubation of FND solutions in cellular culture provides the means for reading temperature both *in situ* and in real time, which becomes a useful medical tool for a complementary cancer diagnosis.

Speaker Biography

Martín Pedroza-Montero has completed his PhD from University of Sonora, México and he cofunded three scientific groups devoted to the study synthesis of nanovectors tissue specific, nanoplatforms for bio spectroscopic cell studies and physics of cancer. He is the former director (2014-2018) of Department for Research in Physics of University of Sonora. He has published more than 50 papers in reputed journals and has been serving as referee in specialized journal of nanotechnology, nanoparticles, physics and medicine.

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