DIPARTIMENTO DI MATEMATICA E FISICA "NICCOLÒ TARTAGLIA"

Nanohybrid materials synthesized by means of pulsed laser deposition and their application for photoconversion devices

Introduce:
Dott.ssa STEFANIA PAGLIARA, Università Cattolica del Sacro Cuore

Interviene:
Prof. MY ALI EL KHAKANI
Institut National de la Recherche Scientifique(INRS), Centre-Énergie, Matériaux et Télécommunications, Université du Québec

Abstract
We will briefly highlight the specific aspects of the pulsed-laser deposition (PLD) technique and its ability for the synthesis of nanomaterials and/or nanohybrid (NH) structures. We will show, in particular, that the PLD can be used to deposit highly-crystalline PbS nanoparticles (NPs) onto various substrates with the latitude to tailor their size, and hence their photoluminescence properties over the (850-1650) nm range.[1] On the other hand, we will show that the PLD is very appropriate for the straightforward synthesis of nanohybrid materials consisting of 1D-nanowires (SWCNT or TiO2-NRs) controllably decorated with PbS-NPs. Two examples will be given, namely (i) the achievement of SWCNT/PbS-NPs nanohybrids based photoconductive (PC) devices exhibiting very high photoresponses (˜700 % and ˜1400 % at 633 and 405 nm, respectively),[2] and (ii) the PLD decoration of TiO2−NRs/SWCNTs nanostructures by PbS-NPs for the successful fabrication of nano-heterojunction PV devices of which PCE was as high as 5.3%.[3] The highly efficient charge transfer between PbS-NPs and SWCNTs is thought to be a key factor for the impressive PC/PV properties of these PLD grown nanohybrids, where the occurrence of multi-exciton generation (MEG) has been recently demonstrated.[4]

REFERENCES:

[1] I. ka, D. Ma and M. A. El Khakani, J. Nanopart. Res., 13 (2011) 2269.
[2] I. Ka, V. Le Borgne, D. Ma, and M. A. El Khakani, Adv. Mater., 24 (2012) 6289.
[3] I. Ka, B. Gonfa, V. Le Borgne, D. Ma, M. A. El Khakani, Adv. Funct. Mater., 24 (2014) 4042.
[4] I. Ka, V. Le Borgne, K. Fujisawa, T. Hayashi, Y.A Kim, M. Endo, D. Ma, M. A. El Khakani, Scientific Reports, accepted (2015).

Seminario

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