PHOTOPHYSICAL PROPERTIES OF ORGANIC AND INORGANIC NANOPARTICLES

F. Elisei, G. G. Aloisi, M. Amelia, B. Carlotti and L. Latterini

Dipartimento di Chimica and Centro di Eccellenza Materiali Innovativi Nanostrutturati (CENIM), University of Perugia, Via Elce di Sotto 8, 06123 Perugia, Italy;

elisei@unipg.it

Organic or inorganic nanoparticles are building blocks of new functionalised materials for applications in many fields [1,2]. Many efforts have been made in the synthesis of nanoparticles starting from new materials in order to reach specific chemical or optical properties of the particles. In particular, it has been proved that the spectral and chemical properties of semiconductor nanocrystals (QDs) are strongly dependent on their size which can be modulated by the synthetic method. On the other hand, organic particles which are more easily prepared, are very interesting for their remarkable photochemical, catalytical electrochemical, and biochemical properties. The efforts in their preparation both by organic synthesis and self-assembling techniques are devoted to modify their size and the nature of their surface [3].
In the present work the synthesis of water soluble CdS nanoparticles and organic nanocrystals prepared in different experimental conditions will be presented. The particles have been characterized in terms of absorption and emission spectra, emission quantum yields and fluorescence decay times. In particular, the spectral properties coupled with atomic force microscopy measurements show that the methods of synthesis allow to modulate the size of QDs in the 3-6 nm range.
Porphyrin and perylene based nanoparticles have been studied to elucidate the effect of the preparation conditions in the particle morphology and the relation with their local emission properties investigated by confocal fluorescence microscopy. Results on the chemical stabilization processes carried out on the organic particles will be presented in order to obtain stable probes to apply in biological studies.

[1] W. J. Parak; D. Gerion; T. Pellegrino; D. Zanchet; C. Micheel; S.C. Williams; R. Boundreau; M.A. Le Gros; C.A. Larabell; A.P. Alivisatos, Nanotechnology, **14** (2003) R15-R27.
[2] D. Horn; J. Rieger, Angew. Chem. Int. Ed., **40** (2001) , 4330-4361.
[3] R. Xie; D. Xiao; H. Fu; X. Ji; W. Yang; J. Yao, New J. Chem., **25** (2001), 1362-1364