# "SYNTHESIS OF FLUORESCENT NANOCOMPOSITES CONSTITUTED OF $GdPO_4:Eu^{3+}$ AND $Tb^{3+}$ NANOWIRES EMBEDDED IN A SILICON POLYMER"

A. Garrido Hernández [1,2], A. Potdevin[2], D. Boyer[2], G. Chadeyron[2], A. García Murillo[1], F. de J. Carrillo Romo[1] and R. Mahiou[2]

[1]Instituto Politécnico Nacional, CIITEC IPN, México D.F, México

[2]Institut de Chimie de Clermont-Ferrand, UMR 6296 CNRS / UBP / ENSCCF, 24 avenue des Landais, BP 80026, 63171 Aubiere Cedex - France

Rare-earth doped lanthanides orthophosphates ($LnPO_4$) represent a class of materials with significant technological importance. Recently, new applications of nanoscale phosphors, including biolabelling, optical imaging or luminescent transparent layers have attracted intensive interests. As a result, several synthesis methods leading to $LnPO_4$ nanocrystals with controlled shape have been developed, based on hydrothermal reactions or thermolysis process for instance. It is well known that the reduction of particles size or the modification of their shape can dramatically modify their physico-chemical properties.

In this work $Eu^{3+}$ and $Tb^{3+}$ doped $GdPO_4$ nanowires were successfully synthetized by a new hydrothermal method. The particles morphology was controlled by changing different parameters like the pH and the synthesis temperature or by using the glycerol as co-solvent. Their structural characterization was performed by X-ray diffraction analyses and by infrared spectroscopy. Depending on the synthesis conditions, transmission electron microscopy images have revealed the achievement of hexagonal nanoparticles or nanowires with narrow size distributions. Their photoluminescent properties were investigated and compared upon excitation in the UV range. Luminescent composite films were prepared by dispersing these fluorescent nanomaterials in a silicon matrix by the coatmaster technique. SEM observations were carried out to evidence the incorporation of $GdPO_4$ nanomaterials into the silicon matrix. Finally, the influence of the $GdPO_4$ shape on the maximum loading rate and on the optical properties of composite films was studied.