**Poster MS14**

# UV-Emitting ZnO Nanocrystals Prepared by Supercritical Fluids Approach for Optochemical Sensing

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Zinc oxide is well-known material with many applications in different practical fields such as piezoelectric transducers, optical waveguides, surface acoustic wave devices, transparent conductive oxides, photocatalysis, chemical and gas sensors, spin functional devices and UV-light emitters. In recent years has been developed a number of synthetic methods for the formation of ZnO nanoparticles with different size and morphology such as nanorods, nanowires, nanotubes, nanorings, tetrapods...

We report here the synthesis of well-crystallized and excitonic-only luminescence ZnO nanocrystals by supercritical fluid route in micro- and millifluidic reactors [1-2]. This new supercritical fluidic based approach is developed on the concept of the separation of the nucleation & growth and functionalization steps and allows the design of different kinds of nanostructures with controlled surface properties [3]. We also propose to discuss the mechanism of ZnO NCs formation allowing explaining the unique optical properties of this high quality NCs.

In this study, UV-emitting ZnO nanocrystals have been synthesized in supercritical ethanol at 250°C and 25MPa. We propose to discuss the influence of the main operating parameters (reactor characteristics, temperature, pressure, residence time, influence of surfactant concentration etc.) on the material optical properties. In all cases, we obtained well-crystallized ZnO nanocrystals (3-5 nm). Photoluminescence (PL) spectra have been measured at room and low temperatures and are characterized with a single excitonic peak located at 377 nm (E = 3.3 eV), no significant defect emission band being detected which is unusual for such small size of ZnO nanoparticles.

**References**

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