MULTI-SOLVENT ZnO STABLE COLLOIDAL DISPERSIONS VIA ORGANOMETALLIC METHOD

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Metal oxide nanoparticles with tunable morphologies are desirable for many applications including energy conversion, electronics and optics. ZnO nanoparticles are among the most widely used metal oxides nanoparticles. Indeed, ZnO is a wide band gap semi-conductor that displays luminescent properties in the near ultraviolet and visible regions. These properties are translated into a wide range of applications such as gas sensors,[1] optoelectronics,[2] field-emission devices,[3] photo-anodes or dye-sensitized solar cells,[4] and bio-imaging.[5] We are interested in designing water-soluble ZnO nanoparticles, with well defined structure and properties.

Recently we reported a very simple synthetic method for the preparation of zinc oxide nanoparticles based on decomposition of an organometallic precursor[6] in organic media. The growth and final morphology were controlled by the use of long alkyl chain ligands. However these particles were redispersible in some organic solvent but not in water or protic solvents.

Here we present a modification of our previously reported procedure based on the think-wise selection of the stabilizing agent. This new methodology enables the dispersion of the obtained particles in both organic and protic solvents without further modifications. The dispersion of the particles in water is especially noteworthy due to potential environmentally friendly applications. The size and shape of the particles can be tuned (spheres or rods between 3-20nm) by changing the experimental conditions.

The fluorescent properties of ZnO oxide nanoparticles depend on the defects present in the lattice: emissions in red[7], green[8], yellow[9] or blue[10] regions are reported.

In the present study particles synthesized using carboxylic acids or amines as stabilizing functional groups were investigated. Changes in the particle defects are related to the selection of the stabilizing agent. Therefore using carboxylic acid only yellow emission is observed. However yellow or blue emissions resulted in the case of amines. The emissions can be tuned by varying the excitation energy (**Figure 1**). These observations keep unchanged regardless to the solvent in which the particles dispersed.

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Figures:

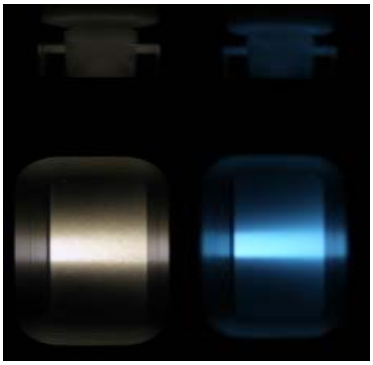

Figure 1.

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