B_2O_3 nanodisks synthesized by liquid laser ablation

Alice SCIORTINO - *University of Palermo, Italy*

Boron is a light chemical element which can be employed in different applications as refractive materials, semiconductors or in medical applications as the neutron capture therapy. Boron is similar to Carbon in terms of possibility to stabilize covalent bonds to form extended structures. For these reasons, extensive studies are going on Boron-based materials. Recently, for examples, synthesis and characterization of boron-based nanotubes, nanoribbons or nanowires gained much attention in the literature.

Here, we used nanosecond laser ablation of Boron crystals in water to synthesize a new type of luminescent Boron-based nanoparticles which appear to be promising for applications in photonics and nanosensing. We found out that the synthesis produces hexagonal B_2O_3 monocrystals with a good colloidal stability. HRTEM and AFM results suggest that the nanomaterials are not spherical nanoparticles but, on the contrary, the synthesized nanoobjects have a lateral size of ~12 nm and a height of ~2 nm, hence, they can be represented as B_2O_3 nanodisks.

Under near-UV excitation, this new nanomaterial displays blue emission which is selectively sensitive to Ni^{2+} ions in solution. In particular, the nanodisks seem to respond to extremely small amount of Nickel in solution as low as 1 ppb. Moreover, preliminary results on the B_2O_3-nanodisks cytocompatibility suggest that it is a not toxic nanomaterial.
Our characterization shows that we synthesized a new boron-based nanomaterials which can be in principle useful in several applications as nanosensors or as agents in biological experiments.