

NANOSTRUCTURES: NANOPOWERS AND POROUS MATERIALS

Innovations and benefits - Production of nanopowders by laser pyrolysis with controlled dimensions and morphology. Ceramic nanopowders have mechanical, thermo-mechanical and functional properties which are superior compared to conventional materials. Nanostructures are widely used in many fields related to energy and the environment.

Use - The nanopowders produced by pyrolysis can be of different types: from ceramic materials, to ceramic oxides, such as Al_2O_3 , TiO_2 and Fe_2O_3 , to Si nanoparticles and silicon-containing materials such as SiC, Si_3N_4 or SiO_2 . These can be used for structural applications in nanocomposites and for coatings as protective coatings in the Cultural Heritage sector. Therefore, once functionalized they can have wide applications also in the field of photonics and optoelectronics, as well as in vivo and in vitro imaging, in catalysis and heat exchange.

Applications and ongoing Activities - Nanocomposites have application prospects in the energy, biomedical and transport sectors.

Nanopowders have been used to make cooling nanofluids in a European project (HENIX) and to produce hydrophobic nanocomposites.

In the field of Cultural Heritage, the properties of polymeric protective coatings were investigated, where TiO_2 and SiO_2 nanoparticles were inserted inside.

The plant for the production of nanopowders by laser pyrolysis allows to obtain high purity powders and controlled stoichiometry. In this context, intense activity is aimed at optimizing the synthesis parameters for the production of functional controlled morphology nanopowders for applications in different technological sectors.

