

# NANOSTRUCTURED MATERIALS: SYNTHESIS, STRUCTURAL AND MAGNETIC PROPERTIES Oral

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The synthesis of artificially structured solid-state materials with nanometer-sized geometries and different entities inside them are actually strongly investigated because of the exciting novel quantum size physical effects displayed by these systems and, at the same time, due to its increasing interest in the miniaturization of computational, electro-optical, magnetoelectronic and sensing devices [1]. These novelty nanostructured composites become in promising candidates for many applications in a broad range of scientific and technological areas, such as functionalized arrays for magnetic sensors, ultrahigh density data storage media or spin-based electronic devices, among other applications as for biotechnology, etc.

In this work we pay special emphasis on the control of synthesis parameters leading to different ordering degree for the array symmetry arrangement of the anodic alumina [2], or titania [3], self-assembled nanoporous templates, allowing to fix the nanowires dimensions and inter-wires distances, which also determine the magnetic behavior of highly-ordered metallic nanowires arrays embedded into the nanoporous templates via electrochemical deposition.

Magnetic nanostructured materials in form of nanoparticles or nanowires, with controlled magnetic and magnetocaloric properties can also serve as good candidates for lowering the temperature of nanosized systems [4]. Using simulation techniques we study the entropy change and refrigerant capacity of an assembly of fine magnetic nano-entities as a function of their anisotropy and magnetization, key-parameters of the magnetic behavior of the system. We focus our attention on the anisotropy energy/dipolar energy ratio and we discuss how the magnetocaloric response of an assembly of magnetic nanoparticles may be tuned by an appropriate choice of the magnetic material composition.

Finally, an overview about the more recently applications based on these novel nanostructured materials will be given.

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