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Magnetic nanomaterials and their use in advanced composite materials: control of magnetic properties and applications

Dr. Armando Encinas

IPICYT, San Luis Potosí, Mexico

armando.encinas@ipicyt.edu.mx

ABSTRACT

The use of magnetic nanostructures combined with other materials to obtain composite materials with tailor-made properties has been a very active area of research in recent years. This is because this approach makes it possible to obtain materials with original properties and characteristics that reflect the combination of the properties of the different materials used. In the case of nanostructured magnetic materials, these can be particles, nanowires or three-dimensional structures in which the type of material and its microstructure can be varied in order to modulate their individual magnetic properties. The other material of the composite, which serves as the matrix in which the magnetic material is contained, can be organic or inorganic, hard or soft/flexible and can have multiple shapes, which gives rise to a wide variety of possibilities to fabricate materials with unique properties. In this talk, we will present some examples of these composite materials using nanoparticles or nanowires and discuss different methods of synthesis and fabrication as well as strategies that are used to control and modify their properties and some of their possible applications.