

Strategies for Shape-Controlled Magnetic Iron Oxide Nanoparticles for biomedical applications

María del Puerto Morales¹

Alejandro G. Roca^{1,2}, Lucía Gutiérrez³, Helena Gavilán¹, María Eugênia Fortes Brollo¹, Sabino Veintemillas-Verdaguer¹

¹ Instituto de Ciencia de Materiales de Madrid, ICMM/CSIC, C) Sor Juana Inés de la Cruz 3, 28049 Madrid, Spain.

² Catalan Institute of Nanoscience and Nanotechnology (ICN2), CSIC and BIST, Av. de Serragalliners, s/n, 08193 Bellaterra, Barcelona, Spain.

³ Dept. Química Analítica, Instituto de Nanociencia de Aragón, Universidad de Zaragoza and CIBER-BBN, Campus Río Ebro, C/ Mariano Esquillor Gómez s/n, 50018 Zaragoza, Spain.

puerto@icmm.csic.es

The improvement of the performance of magnetic iron oxide nanoparticles in their different applications requires the design of more complex synthetic nanostructures, uniform in size and with morphologies different from the spherical one (Fig. 1). We critically analyze the synthesis routes for the production of uniform anisometric magnetite/maghemite nanoparticles with different morphologies like cubes, rods, disks, flowers and many others, such as hollow spheres, worms, stars or tetrapods, detecting the key parameters governing the production of these nanoparticles with particular emphasis in the role of the ligands in the final nanoparticle morphology [1]. The main structural and magnetic features as well as the nanotoxicity as a function of the nanoparticle morphology are also described. Finally, the impact of each morphology on the different biomedical applications (hyperthermia, magnetic resonance imaging and drug delivery) are analyzed in detail [2, 3].

References

- [1] Roca et al. *Advanced Drug Delivery Reviews*, December 2018, DOI: 10.1016/j.addr.2018.12.008.
- [2] Del Sol-Fernandez et al., *ACS Appl. Mater. Interfaces* 2019, 11, 26648–26663
- [3] Serantes et al, *Phys. Chem. Chem. Phys.*, 2018, 20, 30445.

Figures

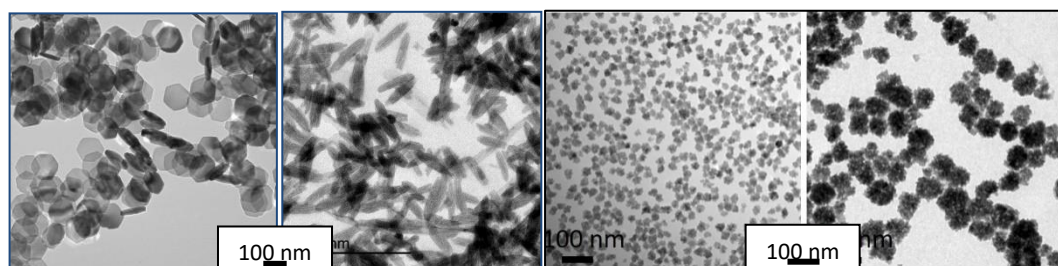


Figure 1. Magnetic iron oxide nanoparticles with different morphologies.