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Proof**CONTROL ID:** 452512**PRESENTATION TYPE:** Poster**CATEGORY:** Life Sciences & applications**PRESENTER:** Rocio Costo**TITLE:** Synthesis of superparamagnetic nanoparticles by non conventional routes and their feasible application as contrast agents**AUTHORS (LAST NAME, FIRST NAME):** Costo, Rocio¹; Roca, Alejandro G.¹; Morales, Maria del Puerto¹; Veintemillas-Verdaguer, Sabino¹**INSTITUTIONS (ALL):** 1. Materiales Particulados, Instituto de Ciencia de Materiales de Madrid, Madrid, Madrid, Spain.**Digest Body:** Magnetic nanoparticles are of increasing technological and biomedical interest due to their unique properties [1]. A wide range of medical uses have been developed, from magnetic drug-targeting to hyperthermia and magnetic resonant imaging (MRI) [2]. In the last case, stable water dispersions of magnetic, small, rounded, hydrophilic particles at physiologic pH are preferred [2, 4] and not all methods to synthesize magnetic nanoparticles are suitable to prepare contrast agents for MRI with long blood circulating time [3].

Alternative synthesis routes have been developed in the last few years to improve the nanoparticles size distribution and the reaction yield. One of these new methods is the laser pyrolysis, which is a promising and versatile method that allows the continuous synthesis of various nanoparticles, with well defined chemical composition, size and structure [9]. On the other hand, thermal decomposition of organo-compounds in organic media allows the synthesis of superparamagnetic iron oxide nanoparticles with controlled size and shape, narrow size distribution and very good crystallinity [6, 7, 8]

In this work, aqueous suspensions stable at pH 7 have been prepared from nanoparticles synthesized by these two new methods. The as prepared particles were further modified by surface coating with carboxylic compounds to make them water stable. In the case of magnetite nanoparticles synthesized by laser pyrolysis, first they were subjected to a pretreatment with nitric acid and iron nitrate to improve their size distribution and then coated with phosphonoacetic acid (Sample L). In the case of the hydrophobic magnetite nanoparticles synthesized by decomposition, dimercaptosuccinic acid was used to remove the oleic acid making them hydrophilic (Sample O). A control sample consisting of a commercial iron oxide contrast agent was used for comparison.

All samples were stable in water in a wide pH range and, in particular at pH 7, they present a high negative charge which assures its stability [table 1]. Aggregate sizes smaller than 90 nm were measured by dynamic light scattering, which is an essential requirement for in vivo applications. Finally, magnetic and relaxometric characterization of these dispersions were carried out and it was concluded that particles with higher crystallinity, and therefore higher magnetization saturation and susceptibility, lead to relaxivity values that are almost three times higher than those measured for commercial MRI contrast agents with similar aggregate size.

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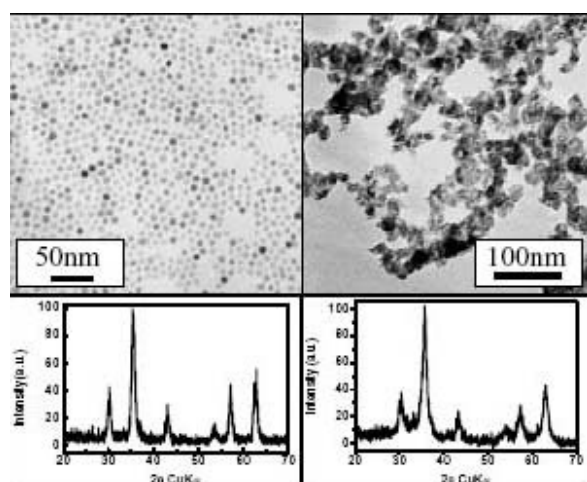
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Table 1

Sample	Particle size (TEM)	Particle size (XRD)	Aggregate size (PCS)	Z-potential at pH=7
Sample O	9.2 nm	12 nm	70 nm	-27 mV
Sample L	8 nm	9 nm	80 nm	-38 mV



TEM images and X-ray diffraction patterns for samples O (left) and L (right)