

## Selected scientific results

### Stage 1

By means of a suitable heat treatment, based on the core-shell structure of the Fe@Pt nanoparticles, an intermediate layer of magnetic ordered FePt alloy phase  $L_{10}$  was obtained at the interface between the Fe core and the outer Pt coating (Fe@FePt $_{L_{10}}$ @Pt). In this way one aims for increasing the coercivity of the nanoparticles system. In the same way, based on Fe@Fe $_{ox}$ @Pt nanoparticles (Fe $_{ox}$  signifies disordered iron oxides phase), an intermediate superparamagnetic ordered layer of Fe $_3$ O $_4$  or Fe $_2$ O $_3$  could be obtained, in this way adjusting both coercivity and saturation magnetization.

The properties of the composites were investigated by TEM, HRTEM, X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS) and magnetization measurements. Also, TEM and HRTEM measurements show the specific morphology and size distributions of these complex systems.

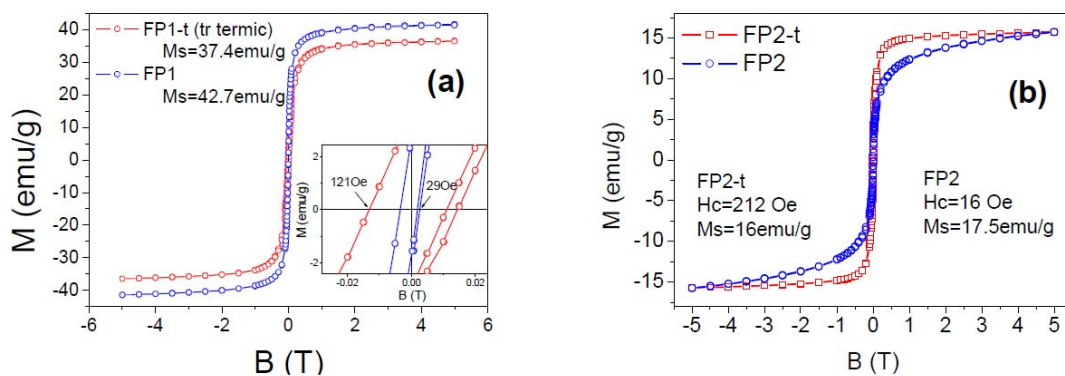


Fig.1 Magnetisation curves  $M(H)$  recorded for two thermally treated samples FP1-t (a) and FP2-t (b), in comparison with their starting systems.

For the two types of samples the causes of thermal treatment are different: for FP1-t is formed a layer of magnetic "hard" FePt alloy phase  $L_{10}$ , while for FP2-t sample an intermediate layer is formed, most probably magnetite.