Electronic Supplementary Information

Multifunctional magnetic nanoparticles for enhanced intracellular drug transport

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Methods

X-Ray powder diffraction (XRD) measurements were performed with a θ-θ 5005 Bruker-AXS diffractometer (Zeiss, Oberkochen, Germany) using Cu $K\alpha$ radiation operating at 40 kV and 30 mA. The average diameter and size distribution were determined by Transmission Electron Microscopy (TEM), using a CM12 PHILIPS microscope operating at 100 kV. A dilute suspension of MNPs in water was drop dried onto 200 mesh carbon-coated copper grids. The statistics of MNPs diameter and size distribution was obtained considering about 400 particles, analyzing the recorded images with the Image Prop plus © software.

Thermogravimetric analysis (TGA) was performed on a Mettler Toledo TGA/SDTA 851^e under air atmosphere. A 5-10 mg portion of nanoparticles was heated to 90 °C at 10 °C/min and kept at 90 °C for 30 min to remove all adsorbed solvent. The sample was then heated to 600 °C at 20 °C/min to determine the amount of organic coating on the nanoparticle surface.

Dynamic Light scattering (DLS) and zeta-potential measurements of MNPs were performed with a Nano Zetasizer (Malvern Instruments, Malvern, UK).

XRD pattern of bare MNPs

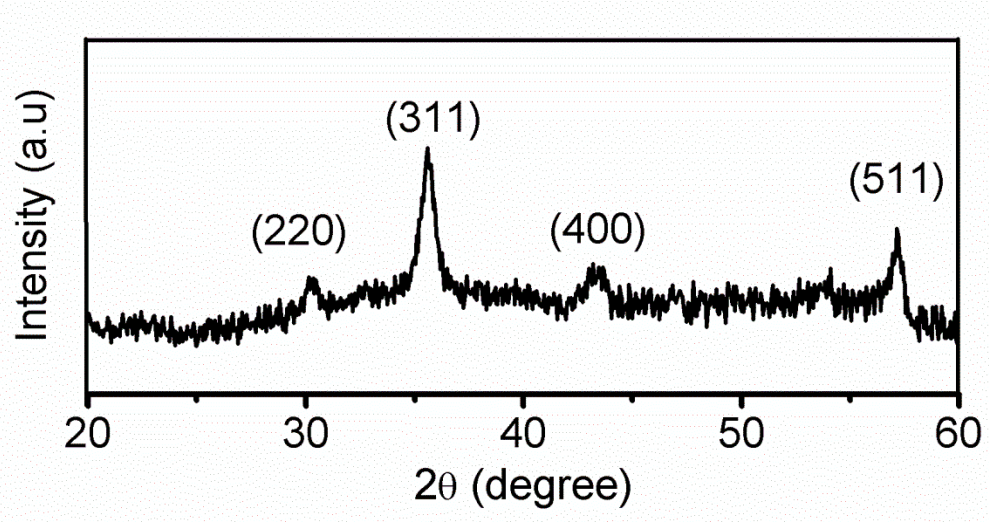


Figure S1. XRD pattern of bare MNPs.

TEM image of bare MNPs

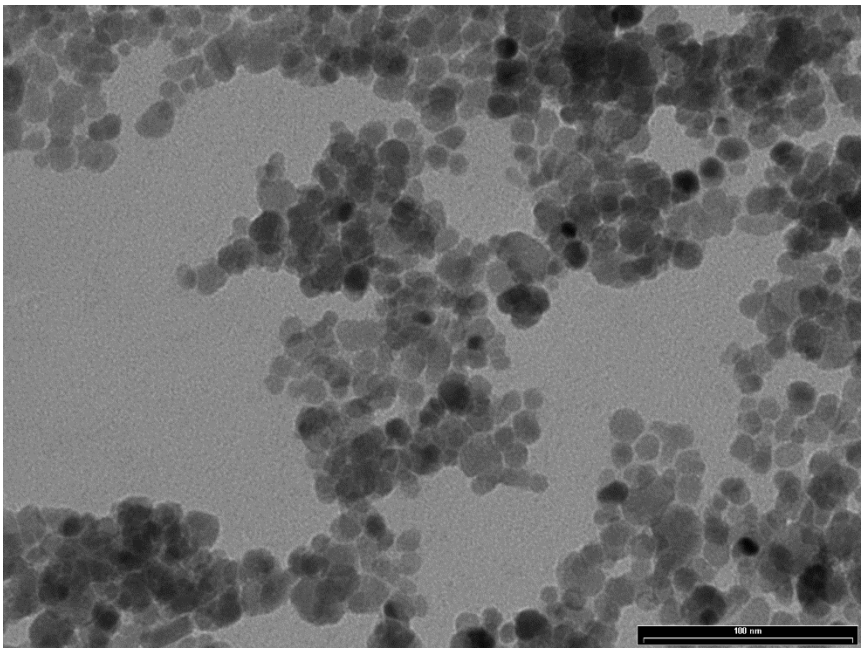


Figure S2. Selected low magnification TEM image of bare MNPs. The scale bar is 100 nm.

Thermogravimetric measurement

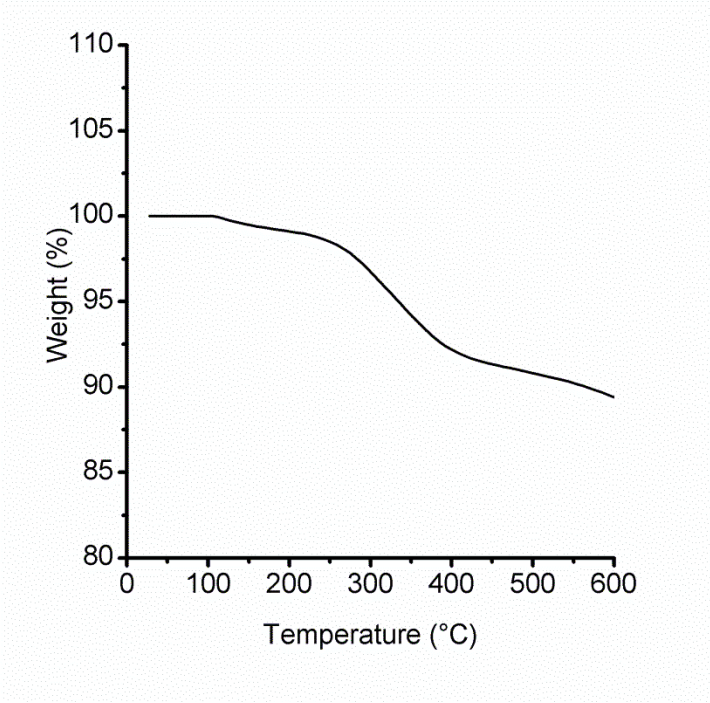


Figure S3. Thermogram of **1**-PA@MNPs.

DLS measurement

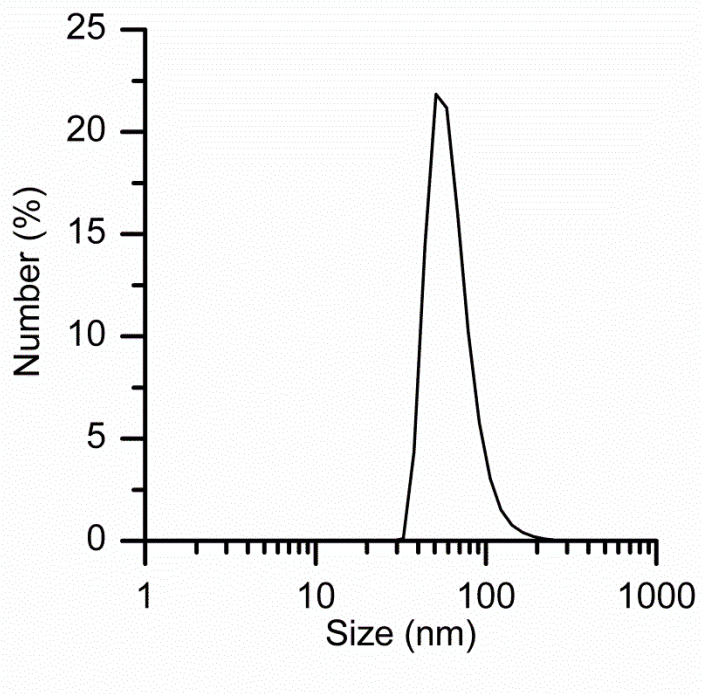


Figure S4. Size distribution in water of **1**-PA@MNPs.

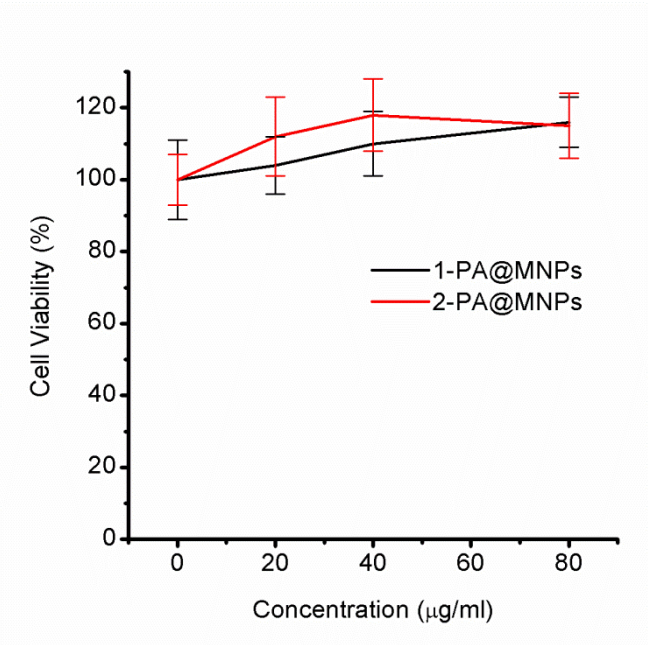


Figure S5. Cell viability of hMSCs evaluated by MTT after 72h of incubation with **1**-PA@MNPs and **2**-PA@MNPs at different concentrations.

Synthesis and characterization of 3-PA@MNPs

3-PA@MNPs were obtained with the same procedure as described for **1**-PA@MNPs but without using folic acid in the last step. Briefly, Tiiii functionalized PA@MNPs were dispersed in DMSO (20 ml) and 5(6)-Carboxy-X-rhodamine N-succinimidyl ester (Rhod-NHS, 1.5 mg) and PEG-NHS (50 mg) were added. The solution was mixed overnight at 25°C and the obtained particles were separated magnetically and washed as described for **1**-PA@MNPs.

3-PA@MNPs were characterized by FTIR and XPS spectroscopy. FT-IR and XPS spectra are similar to those of **1**-PA@MNPs since similar functional groups are present.

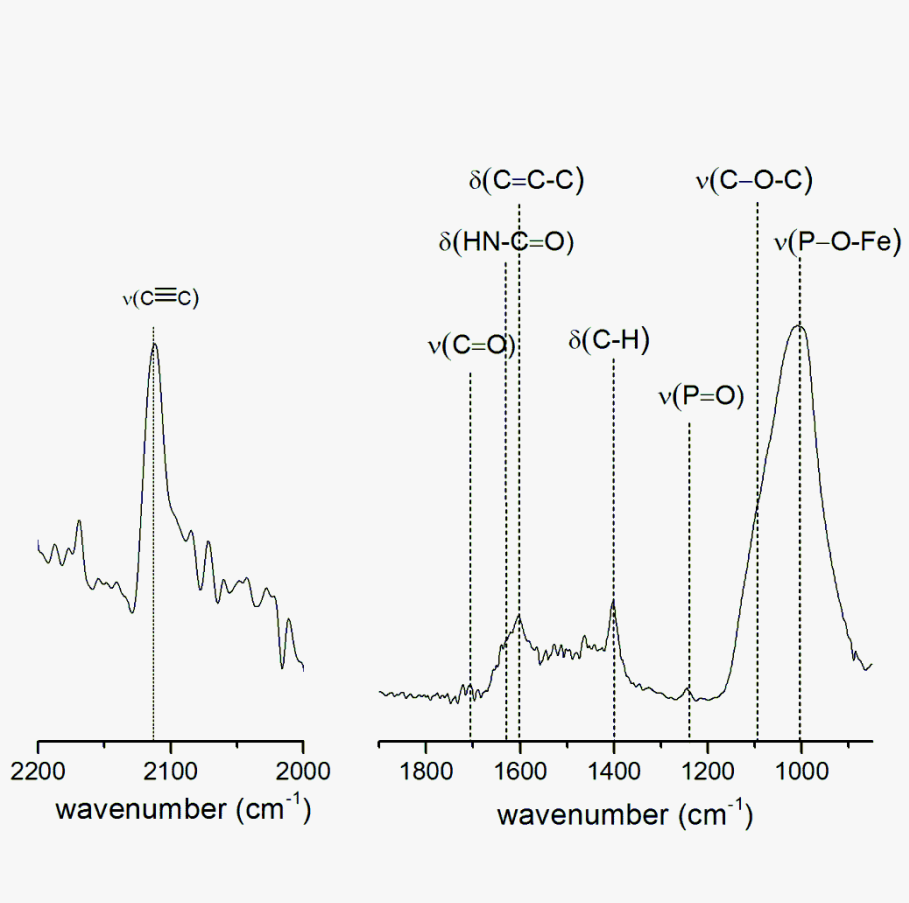
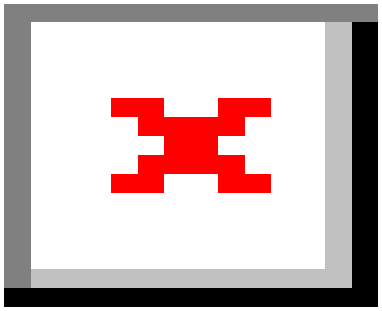
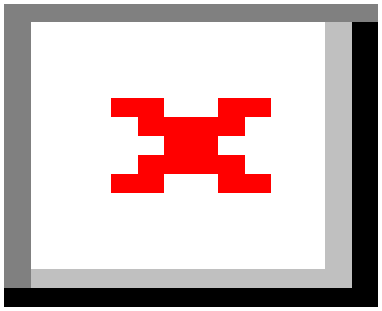


Figure S6. FT-IR spectra of 3-PA@MNPs.



a)



b)

Figure S7. XPS spectra of 3-PA@MNPs a) N1s b) C1s.