Electronic Supplementary Material (ESI) for Nanoscale Advances.

ELECTRONIC SUPPORTING INFORMATION

Assessing the parameters modulating optical losses of iron oxide nanoparticles under near infrared irradiation

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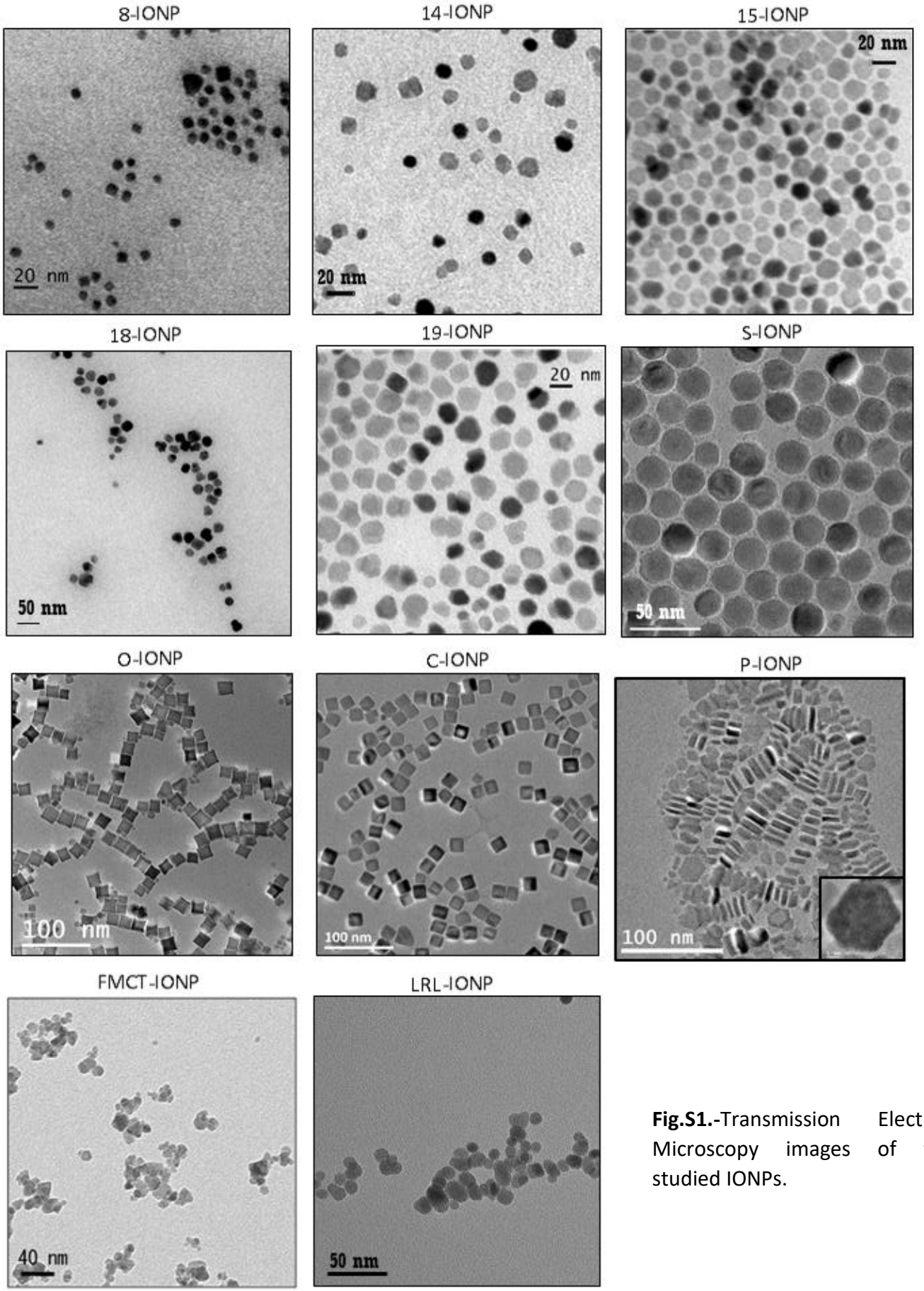


Fig.S1.-Transmission Electron Microscopy images of the studied IONPs.

Table S1.- Summary of magnetic parameters from the studied IONPs at RT. L=length; W= width.

Name	**M_S (Am^2/kg_{Fe})**	**H_C (kA/m)**
8-IONP	92	< 1
14-IONP	106	< 1
15-IONP	107	< 1
18-IONP	55	< 1
19-IONP	104	< 1
FM-CT	120	1.2
LRL	73	3.2
P-IONP	44	< 1
S-IONP	89	< 1
C-IONP	139	≈ 1
O-IONP	149	< 1

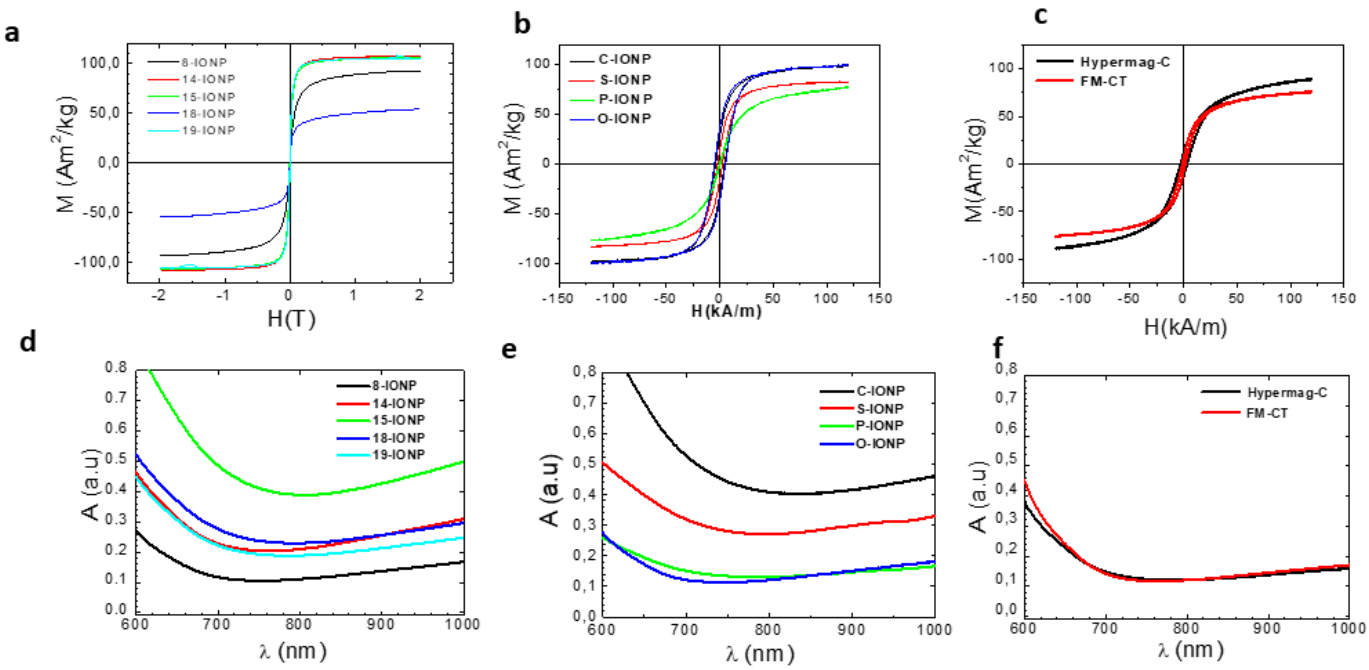


Fig. S2.- (a,b,c) Mass-normalized magnetization cycles under quasi-static conditions at RT; (d,e,f) Optical absorption spectra in the NIR range at RT. The studied IONPs were dispersed in DDW at [Fe] = 1 g/L.

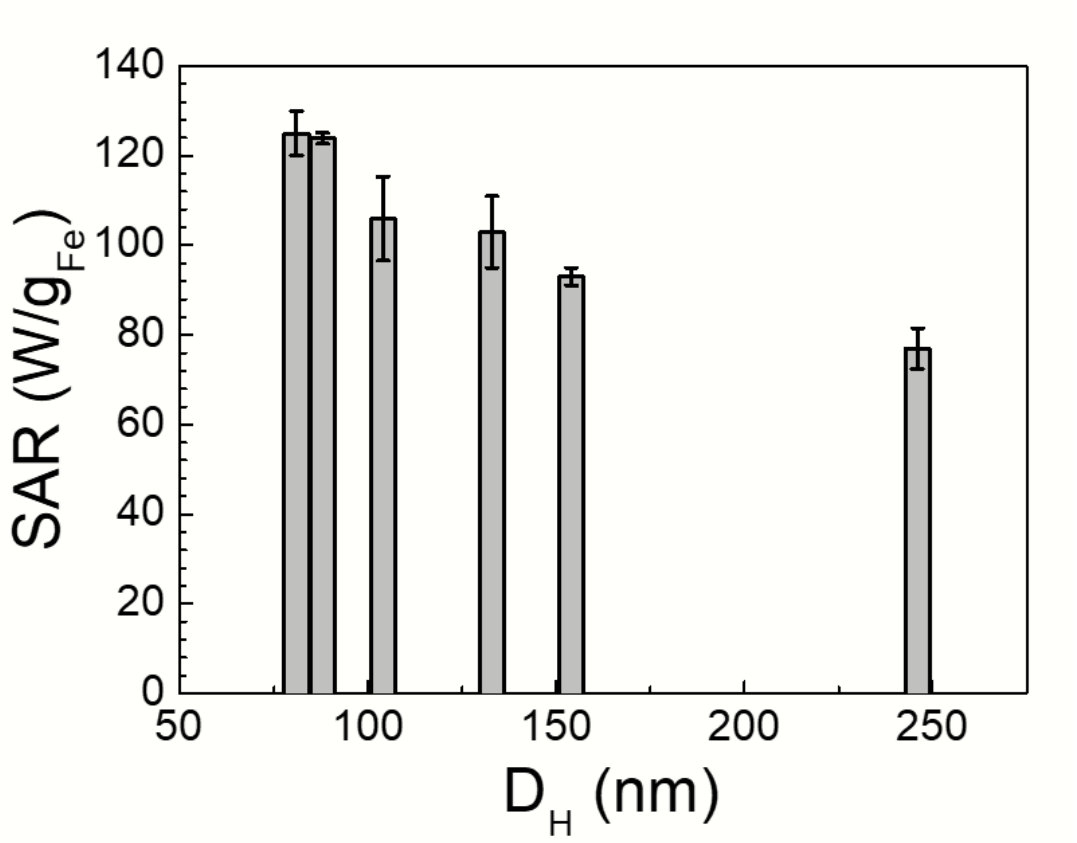


Fig. S3.- Magnetic SAR values of LRL IONPs at different D_H. H_{AC} conditions: 100 kHz, 32 kA/m. Iron content in DDW suspension [Fe]=1g/L.

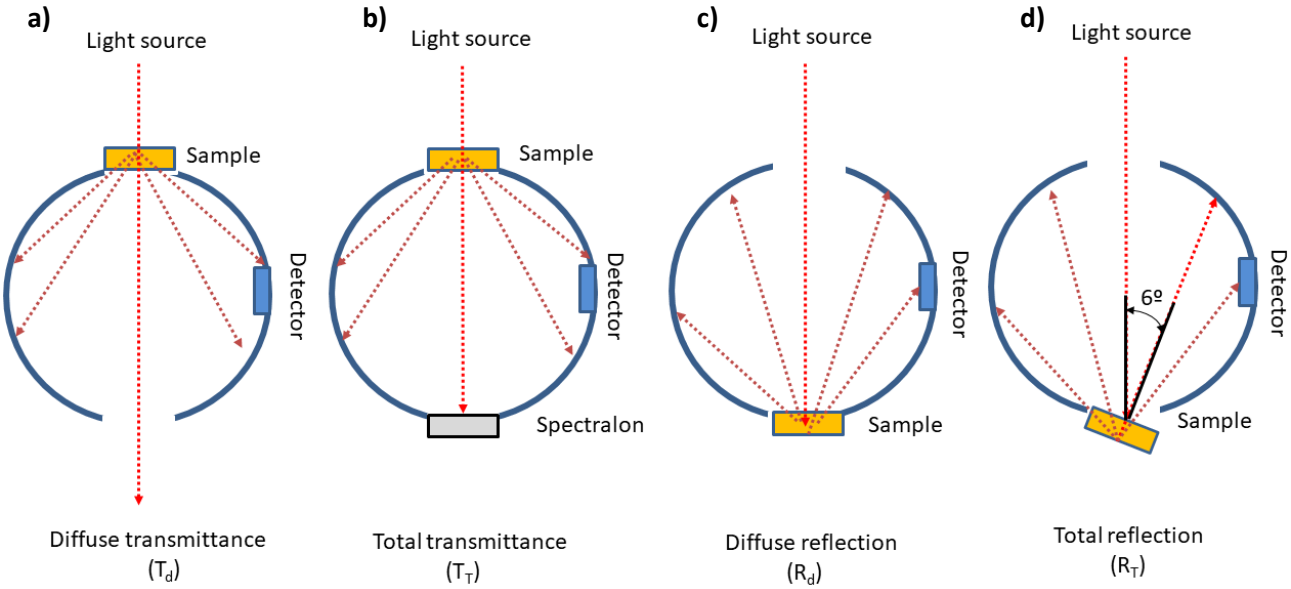


Fig.S4.- Different configurations of the integrating sphere spectrometer for distinct transmission and reflectance measurements: (a) Diffuse transmittance (T_d): the direct transmittance (T_D) escapes the sphere through the open exit port (without spectralon) on the opposite side of the entrance port; (b) Total transmittance (T_T): both direct (T_D) and diffuse (T_d) components of transmittance are collected inside the integrating sphere by blocking the exit port with the spectralon; (c) Diffuse reflection (R_d): direct reflection (R_D) escapes the integrating sphere though the entrance port while diffuse reflection is collected inside the sphere; (d) Total reflection (R_T): sample holder is rotated 6º in order to collect both direct (R_D) and diffuse (R_d)reflection.

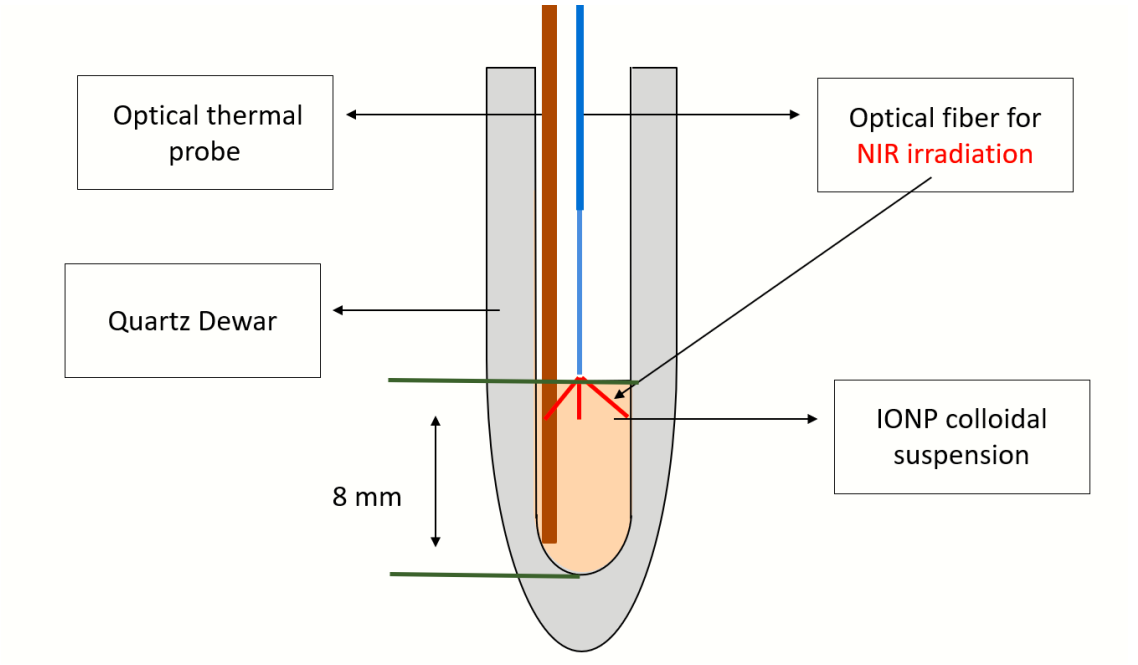


Fig.S5.- Schematic representation of the experimental set up for optical SLP measurements.

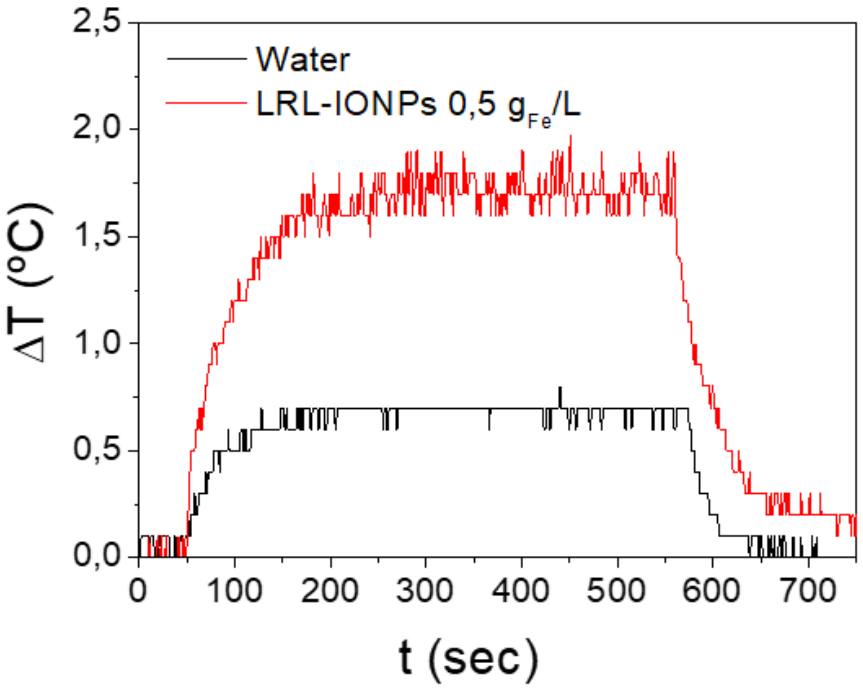


Fig.S6.- Temperature increments of LRL suspensions with [Fe]=0 g/L (water) and 0.5 g_{Fe}/L under NIR (808 nm and 0.3 W/cm^2).

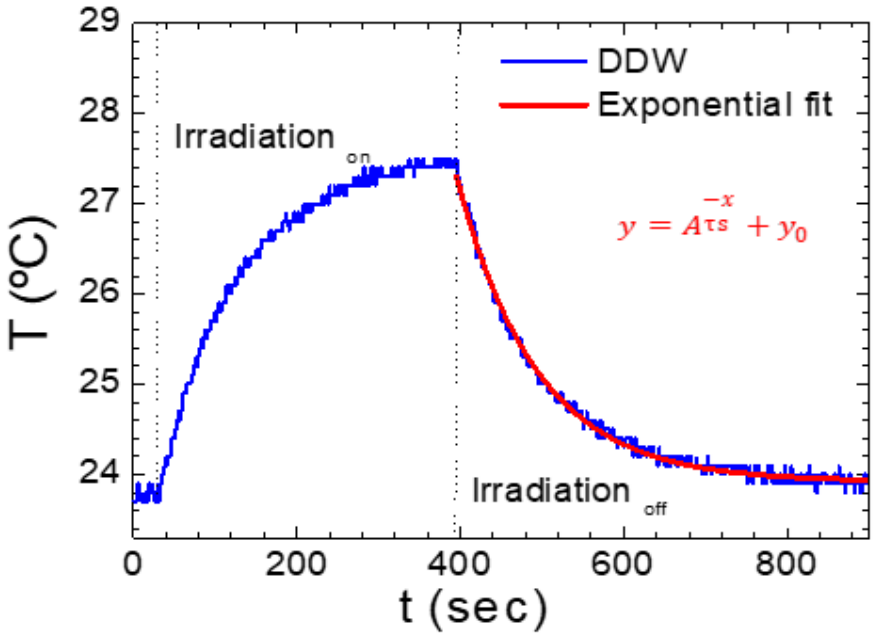


Fig.S7.- Temperature dynamic evolution of the IONP suspension (blue line) and fitting (red line) according to equation Eq.5 (see Experimental section). NIR conditions : 808 nm and 0.3 W/cm^2. C-IONPs dispersed in DDW at [Fe]=1g/L.

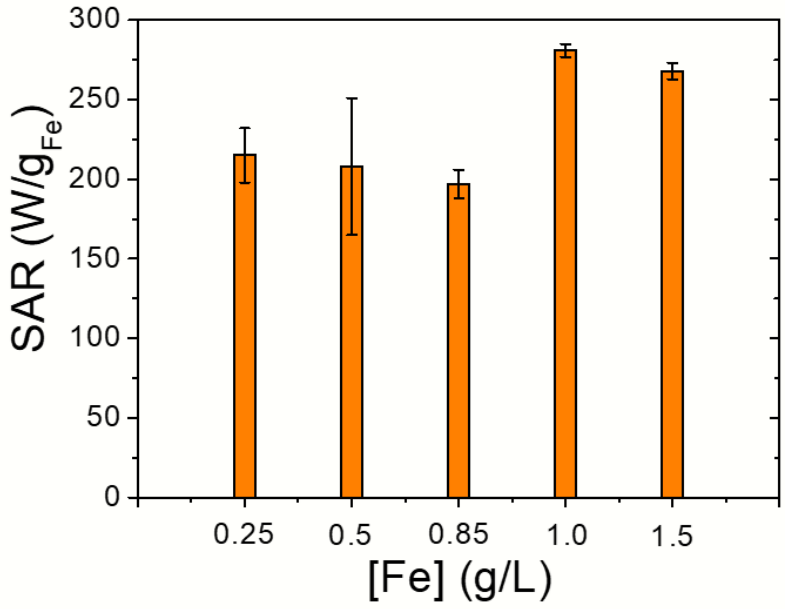


Fig.S8.- Magnetic SAR values of S-IONPs at different Fe concentrations. HAC conditions: 100 kHz, 32 kA/m.

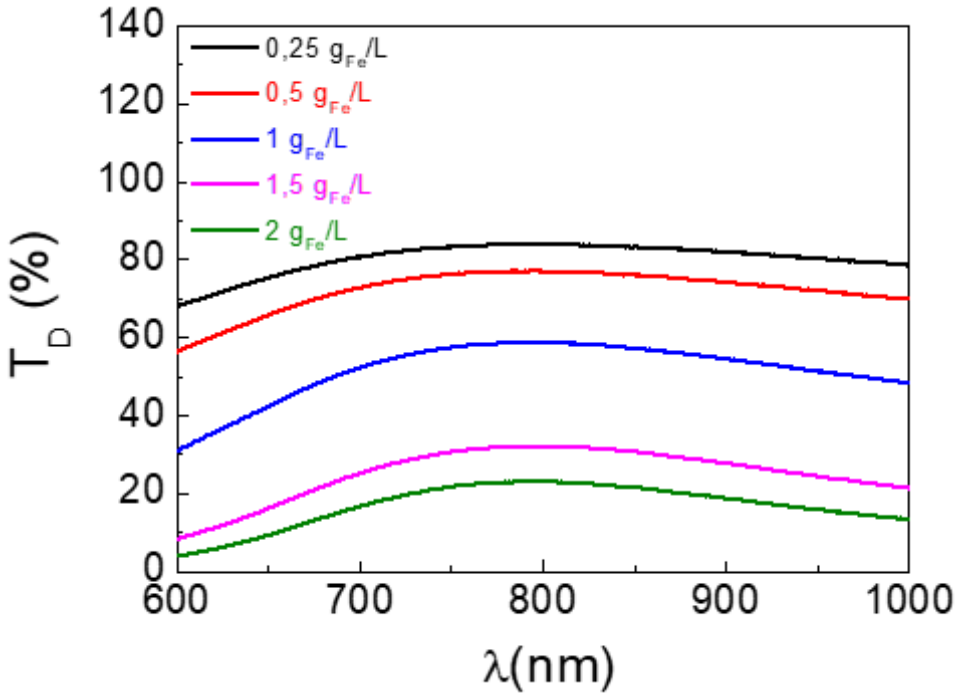
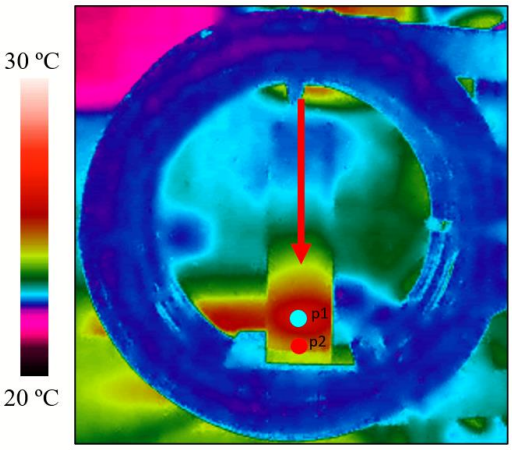
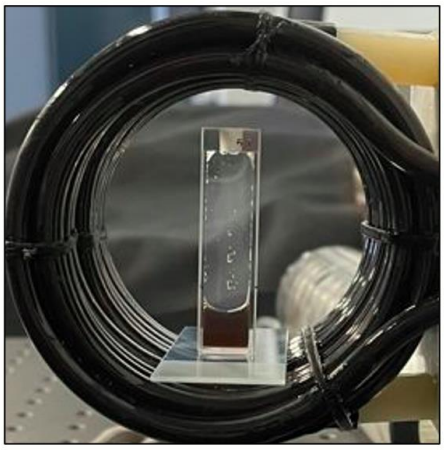


Fig.S9.- Optical direct transmission (T_D) spectra of S-IONPs dispersed in DDW at different iron concentrations.





	C-IONP	O-IONP
T_{p1} (ºC)	26,2	25,8
T_{p2} (ºC)	24,5	24,8
$\Delta T = T_{p1} - T_{p2}$	2,3	1

Fig.S10.- Thermal and visible images showing temperature map along NIR direction (red arrow). Table lists the temperature values at p1 (cyan spot) and p2 (red spot) positions for C-IONP and O-IONP suspensions at [Fe]=1g/L. NIR conditions: 808 nm and 0.3 W/m^2.

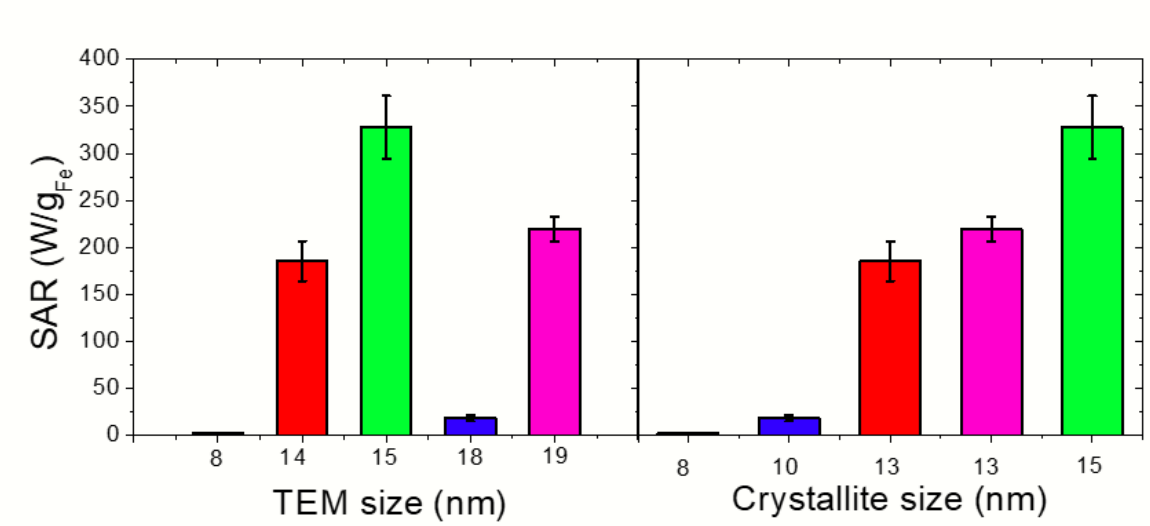


Fig.S11.- Magnetic SLP values of IONPs for different (a) TEM size and (b) crystal size. H_{AC} conditions: 100 kHz, 32 kA/m; Irradiation conditions: 808 nm, and 0.3 W/cm². IONPs were dispersed in DDW at [Fe]= 1 g/L.

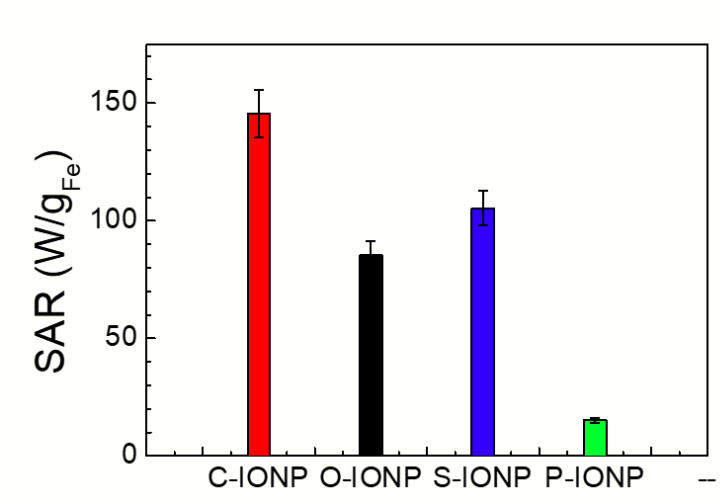


Fig.S12.- Magnetic SLP values of IONPs with different shape. H_{AC} conditions: 100 kHz, 32 kA/m; Irradiation conditions: 808 nm, 0,3 W/cm². IONPs were dispersed in DDW at [Fe]= 1 g/L.

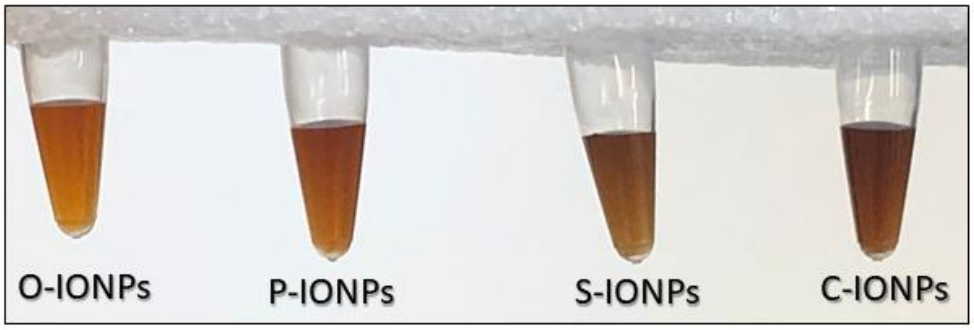


Fig.S13.- Picture of IONP colloids of different shapes at iron content [Fe]= 0.8 g_{Fe}/L. Note the differences in colour of suspensions, getting darker in samples to the right.

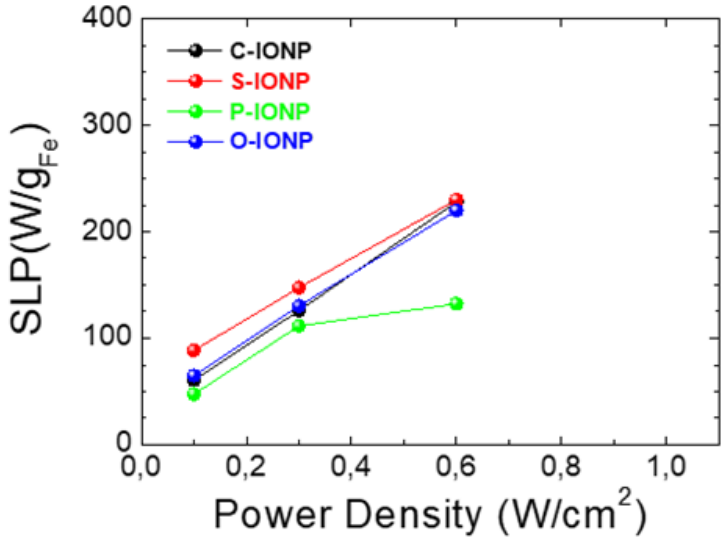


Fig.S14.- Optical SLP values as a function of irradiation power densities (from 0 to 0.6 W/cm², λ_{exc} = 808 nm) for IONPs of different shapes. The studied IONPs were dispersed in DDW at [Fe]= 1 g/L.

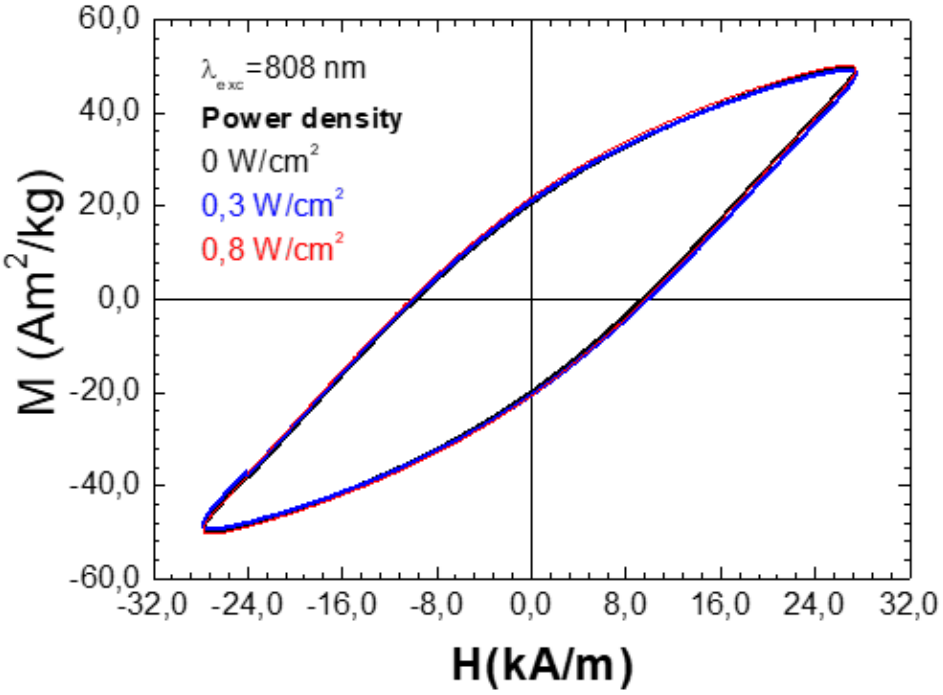


Fig. S15.-AC Hysteresis loops of 19-IONP under H_{AC} (100 kHz and 26 kA/m) subjected to different irradiation power densities at λ_{exc} = 808 nm: 0 (black colour), 0.3 (blue colour) and 0.8 (red colour) W/cm^2. The studied IONPs were dispersed in DDW at [Fe]= 1 g/L.

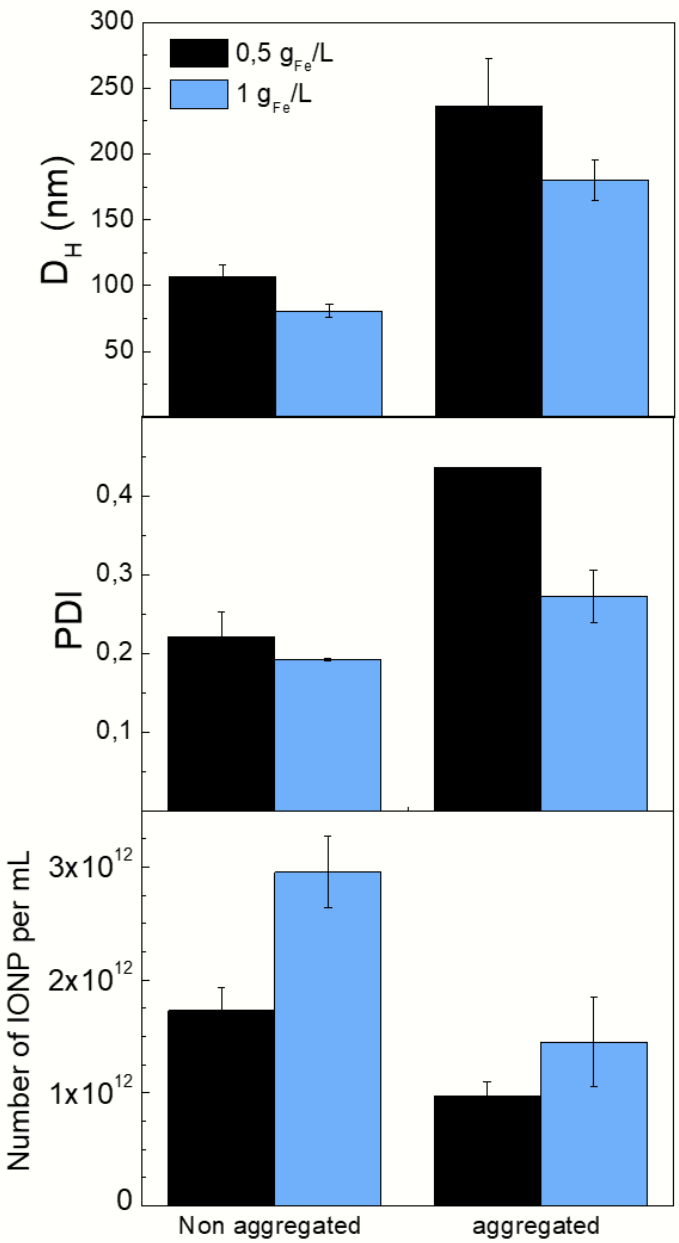


Fig.S16.- (a) Hydrodynamic size (b) PDI values (c) number of LRL nanoparticles per mL under different aggregation conditions at two iron contents: 0.5 g_{Fe}/L (black columns) and 1 g_{Fe}/L (cyan columns).

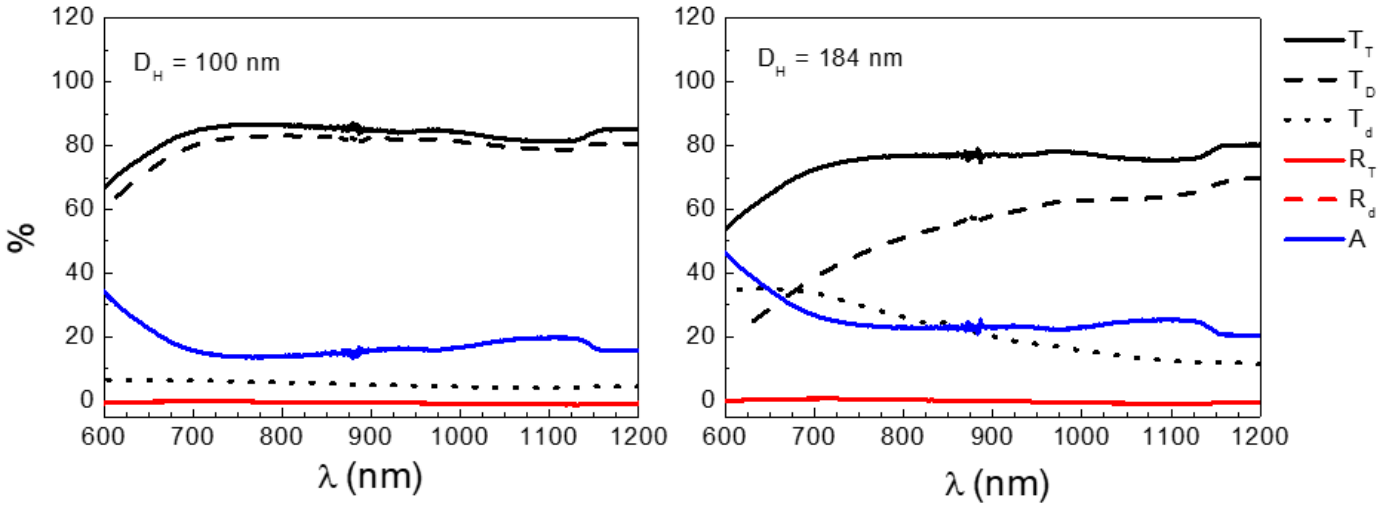


Fig.S17.- Total (T_T), diffuse (T_d) and direct (T_D) transmission, total (R_T) and diffuse (R_d) reflectance, and absorbance (A) of LRL with different D_H at 0.5g_{Fe}/L.

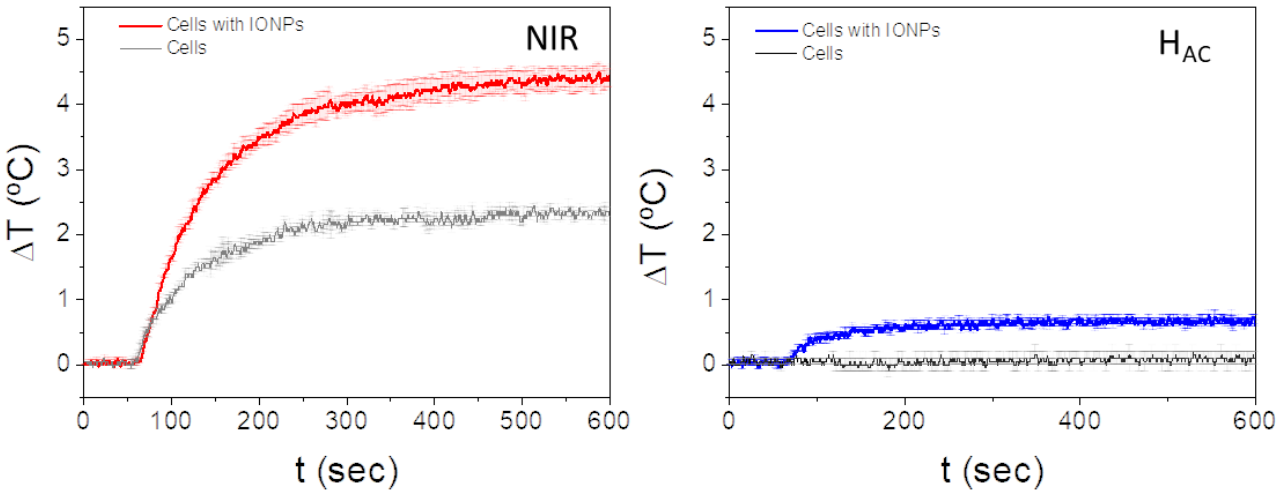


Fig.S18.- Temperature increments of MCF7 cell pellet (cells) and IONPs inside MCF7 cell pellet (cell with IONPs) under NIR (808 nm and 0.3 W/m_2) or H_{AC} (100 kHz and 32 kA/m) conditions. The ΔT values were obtained from three repetitions performed in three independent cell pellets. The iron content in the cell suspensions with IONPs was [Fe]= 2 g/L.

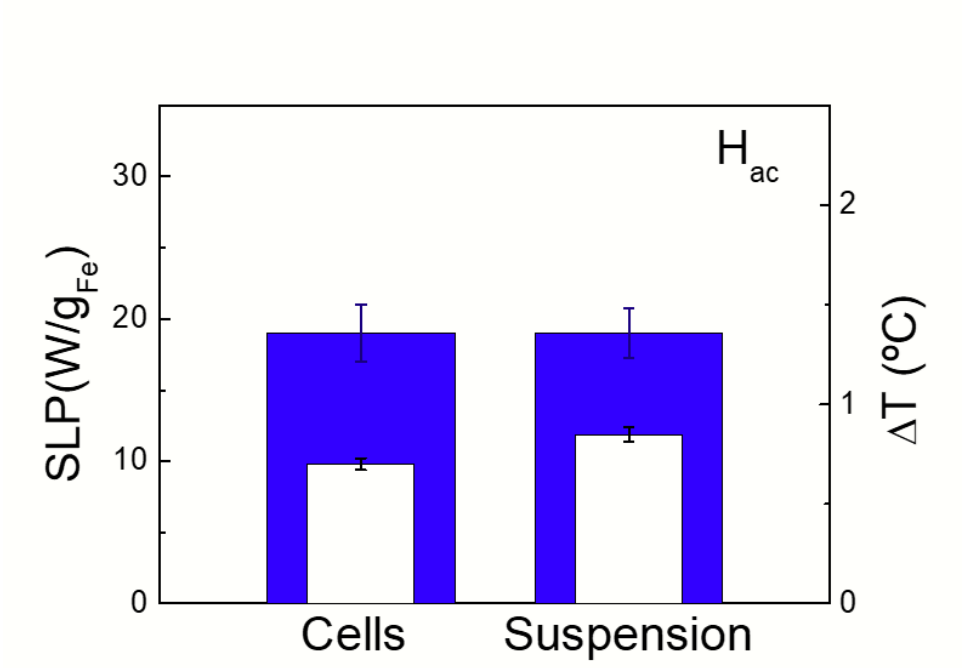


Fig.S19.- Magnetic SLP values (colour columns) and temperature increments (white columns) of FM-CT IONP inside MCF7 breast cancer cells and dispersed in DDW suspension at [Fe]= 2 g/L under H_{AC}. Intracellular SLP and ΔT values were obtained from three repetitions performed in three independent cell pellets. H_{AC} conditions: 100 kHz, 32 kA/m.