

## TECHNICAL SHEET

### NANOMAG\_DEG

**Description:** Fe<sub>3</sub>O<sub>4</sub> nanoparticle suspension in diethylene glycol (DEG)

**Appearance:** dark brown liquid

#### Chemico-Physical Characteristics:

	Instrument	Range
Fe <sub>3</sub> O <sub>4</sub> concentration [% w/w]	ICP-OES	0,95 – 1,05
Average hydrodynamic diameter [nm] Z-average	DLS	18,7 – 50,7
PdI	DLS	0,059 – 0,158
Crystalline diameter [nm]	XRD	9,0 – 14,0
Average inorganic diameter [nm]	TEM	12,0 – 26,0
Blocking Temperature (T <sub>B</sub> ) [K] <sup>1</sup>	SQUID Magnetometer	> 300
Saturation magnetization (M <sub>S</sub> ) at 300K [Am <sup>2</sup> /kg]	SQUID Magnetometer	66,0 – 72,0
Saturation magnetization (M <sub>S</sub> ) at 5K [Am <sup>2</sup> /kg]	SQUID Magnetometer	75,0 – 82,0
Remnant Magnetization (M <sub>r</sub> ) at 300K [Am <sup>2</sup> /kg]	SQUID Magnetometer	0
Remnant magnetization (M <sub>r</sub> ) at 5K [Am <sup>2</sup> /kg]	SQUID Magnetometer	27,2 – 30,6
Coercive Field (H <sub>c</sub> ) at 300K [kA/m]	SQUID Magnetometer	0
Coercive Field (H <sub>c</sub> ) at 10K [kA/m]	SQUID Magnetometer	23,0 – 31,0
Ratio M <sub>r</sub> /M <sub>S</sub> at 10K	SQUID Magnetometer	0,35 – 0,45
RF mediated Hyperthermia (H <sub>0</sub> = 22 (kA/m); f = 356 (kHz)) [W/g]	RF generator <i>pancake</i> coil	700 - 900

<sup>1</sup> Magnetic properties vary with the properties of the matrix in which nanoparticles are dispersed.

## Morphological characterization

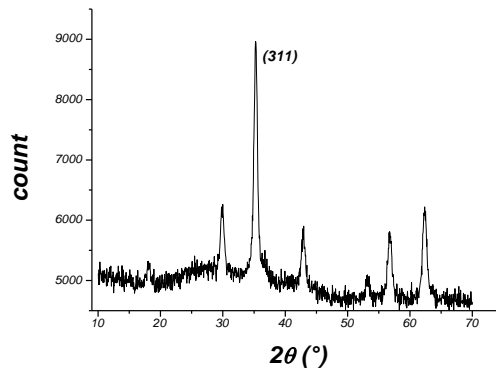


Figure 1 Powder X-ray diffraction pattern.

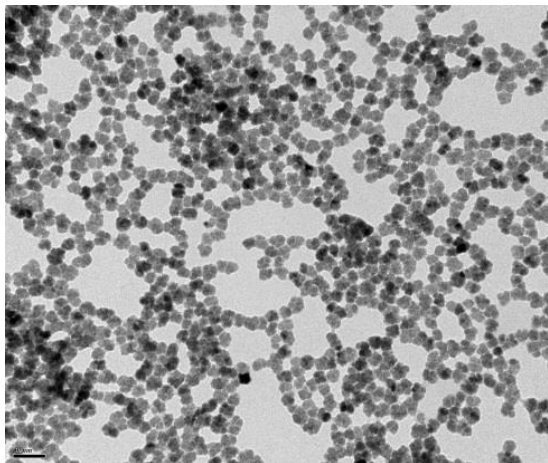


Figure 2 Transmission electron microscopy of NANOMAG\_DEG

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## Magnetic characterization

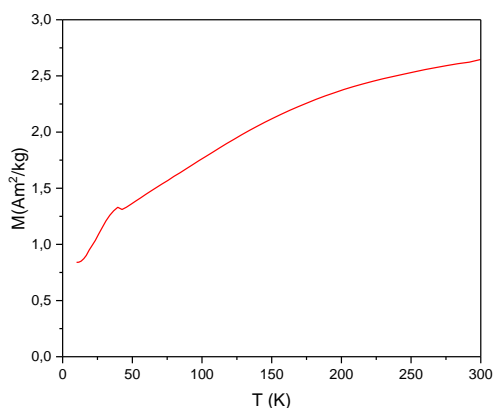


Figure 3 Blocking temperature (H= 4 kA/m)

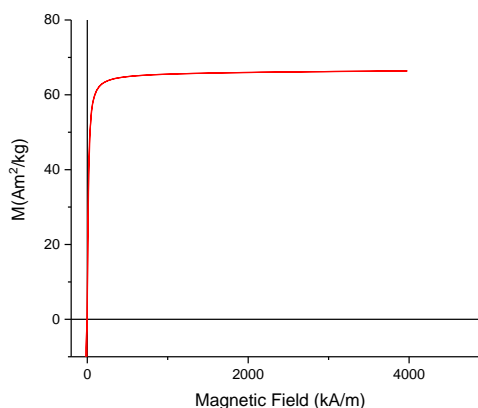


Figure 4 Saturation Magnetization at 300K

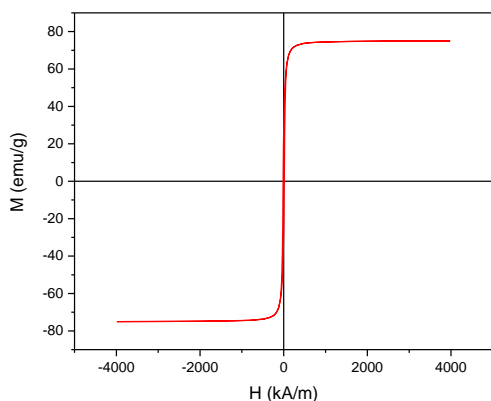


Figure 5 Magnetization loop at 10K

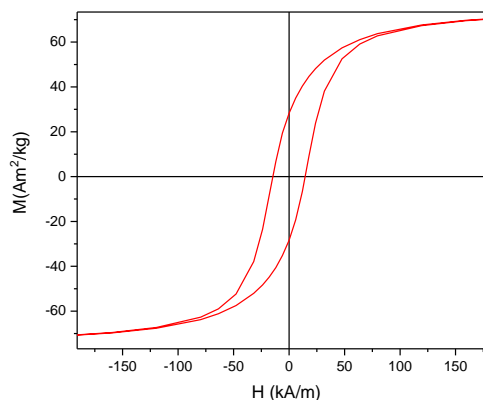


Figure 6 Magnetization loop at 10 K (inset)

## Applications

The product is used for Magnetic Fluid Hyperthermia applications and for encapsulation in organic matrices for the preparation of biocompatible formulations to be employed in the biomedical field.

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