Electronic Supplementary Material (ESI) for RSC Advances.

Size-tunable $NaGdF_4$ nanoparticles as T_2 contrast agents for high-field magnetic resonance imaging

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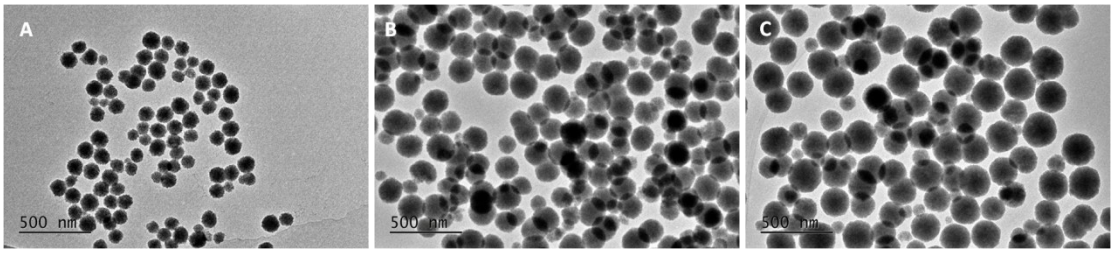

Figure S1. TEM images of $NaGdF_4$ NPs, samples 1 （A）, samples 2 （B）, and samples 3 （C）.

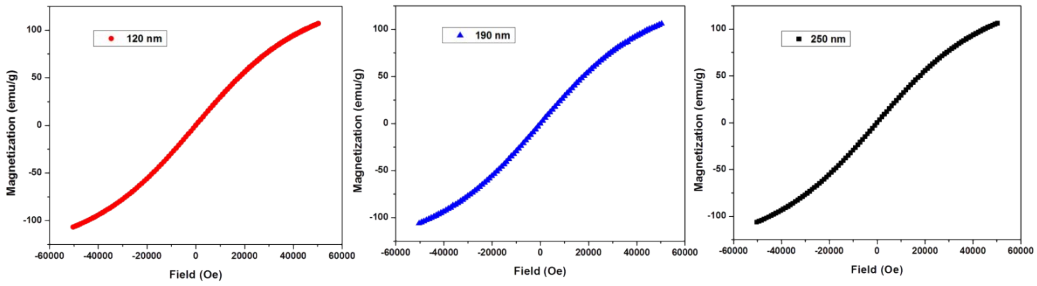

Figure S2 Mass magnetization of different size of $NaGdF_4@SiO_2$ NPs obtained using a SQUID magnetometer. red line: 120 nm, blue line 190 nm, black line 250 nm

Particle size (nm)	r_1/[Gd^{3+}]($mM^{-1}S^{-1}$)		r_2/[Gd^{3+}]($mM^{-1}S^{-1}$)		r_2/r_1	
	0.5 T	7 T	0.5 T	7 T	0.5 T	7 T
120	1.422	0.746	4.359	129.7	3.06	173.8
190	0.548	0.471	5.754	142.9	10.5	303.4
250	0.393	0.272	8.553	159.6	21.76	586.8

Table S1. r_1 and r_2 relaxivity and r_2/r_1 values of $NaGdF_4@SiO_2$ using 0.5 T and 7 T MRI scanner.

	0.5 T				7 T			
Particle size (nm)	r_2/[Gd^{3+}] ($mM^{-1}S^{-1}$)	r_2/M $(mg/ml)^{-1}S^{-1}$	r_2/NP ($mM^{-1}S^{-1}$)	r_2/r_1	r_2/[Gd^{3+}] ($mM^{-1}S^{-1}$)	r_2/M $(mg/ml)^{-1}S^{-1}$	r_2/NP ($mM^{-1}S^{-1}$)	r_2/r_1
120	4.359	17	5.2×10^7	3.06	129.7	512	1.56×10^9	173.8
190	5.754	22	2.7×10^8	10.5	142.9	558	6.81×10^9	303.4
250	8.553	33	9.3×10^8	21.76	159.6	623	1.73×10^{10}	586.8

Table S2. r_2 relaxivity, r_2/M, r_2/NP and r_2/r_1 values of $NaGdF_4@SiO_2$ using 0.5 T and 7 T MRI scanner.

Relaxivity Calculation[1]

The concentration of Gd^{3+} ions determined by ICP-MS in the stock solution was used to calculate the molecular mass of $NaGdF_4$ in the specimen using the tatio

$m(Gd)/m(NaGdF_4) = 0.6137$

This was used to calculate the r_1/M (mass relaxivity) values

The $NaGdF_4$ NPs synthesized have Hexagonal closed pack (HCP)-crystal structure and the density of HCP $NaGdF_4$ 5.65g/cc was used to determine the mass of a NP, considering that the NPs are perfect spheres and their volume determined using

$V = 4/3\pi R^3$ (where R is the radius of the NP)

Comparing the mass of single NP and the total mass determined from ICP-MS the total number of NPs (N) in the stock solution was determined and used to calculate the r_2/NP (Nanoparticle relaxivity)

1. N. J. J. Johnson, W. Oakden, G. J. Stanisz, R. Scott Prosser and F. C. J. M. van Veggel, *Chem. Mater.*, 2011, **23**, 3714-3722.