

Material ID	Material type	Magnetic core	Surface Coating	Zeta Potential (mV)	Particle size (nm)	Relaxivity r2 (s-1/mM)	Field strength (T)	Fe/cell (µg)	Cell Viability (%)	Toxicity
0	Fe2O3-PLL	Maghemite	(polycationic poly(L-lysine) (PLL)	NA	15	NA	1.5	64.51	90	0
1	uncoated	Maghemite	uncoated	-42	10	549	4.7	29.3	23	1
2	D-manose-coated-g-Fe2O3	Maghemite	D-manose	NA	2	509	4.7	21.1	75	1
3	Fe2O3-PLL	Maghemite	(polycationic poly(L-lysine) (PLL)	NA	10	492	4.7	24.5	75	1
4	PDMAAm-coated-g-Fe2O3-PLL	Maghemite	poly(N,N-dimethylacrylamide) (PDMAAm)	NA	10	89	4.7	23.2	75	1
5	N-dodecyl-PEI2k/SPIO	Magnetite	N-dodecyl-grafted PEI 2K	40	54.7	345	3	7.1	100	0
6	iron oxide-loaded cationic nanovesicle	Magnetite	PEI-SA	20	150	343.1	1.5	50.02	100	0
7	iron oxide-loaded cationic nanovesicle	Magnetite	PEG-PGA	20	150	343.1	1.5	50.02	100	0
8	CMCS-SPIONs	Magnetite	Carboxymethyl-chitosan	-21.4	55.4	160.5	1.5	26.7	120	0
9	ED-Pullulan coating SPIO	Magnetite	Ethylenediamine Pullulan	10	94	NA	7	65	120	0
10	IONP-GPEG-HA	Magnetite	Amine-functionalized six-armed PEG covalently linked to hyaluronic acid	-9.1	75	454.5	3	1459	100	0
11	PDMAAm-coated-g-Fe2O3-PLL	Maghemite	poly(N,N-dimethylacrylamide) (PDMAAm)	NA	77.8	27.26	0.5	36.9	120	0
12	Citrate SPION	Magnetite	Citrate	-27.3	90.13	NA	7	69.6	NA	0
13	D-manose-coated SPIONs	Maghemite	D-manose	NA	6	140.4	0.5	51.7	75	1
14	SPIO@SiO2-NH2	Magnetite	SiO2-NH2	NA	8.5	43.5	3	68.7	95.7	0
15	TAT-CLIO	Magnetite	Tat peptide functionalized cross-linking dextran	NA	65.2	73.4	0.47	2.15	101	0

Table S1 Full dataset of SPION's NPs after pre-processing, comprising of their physicochemical and toxicological properties.