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SUPPORTING INFORMATION

Enhanced hyperthermic properties of biocompatible zinc ferrite nanoparticles with charged polysaccharide coating

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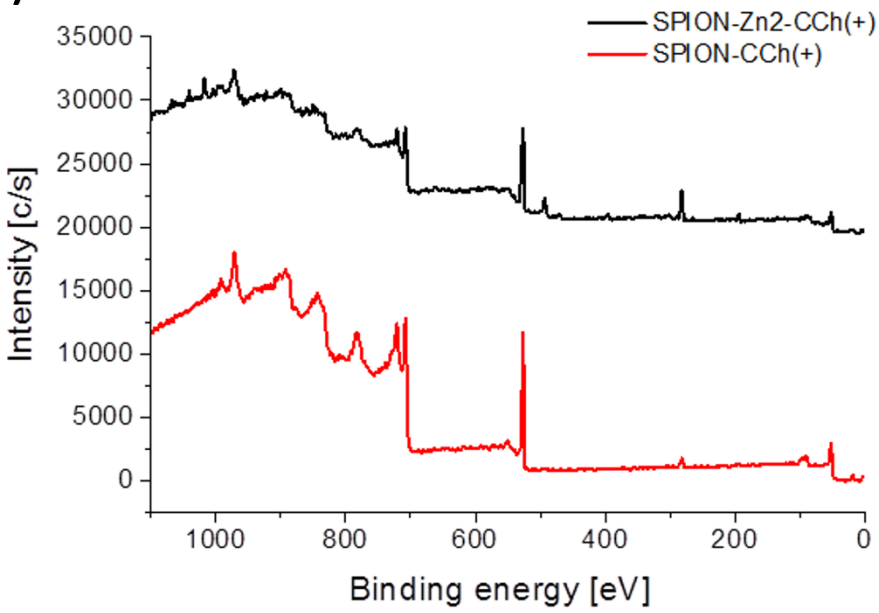
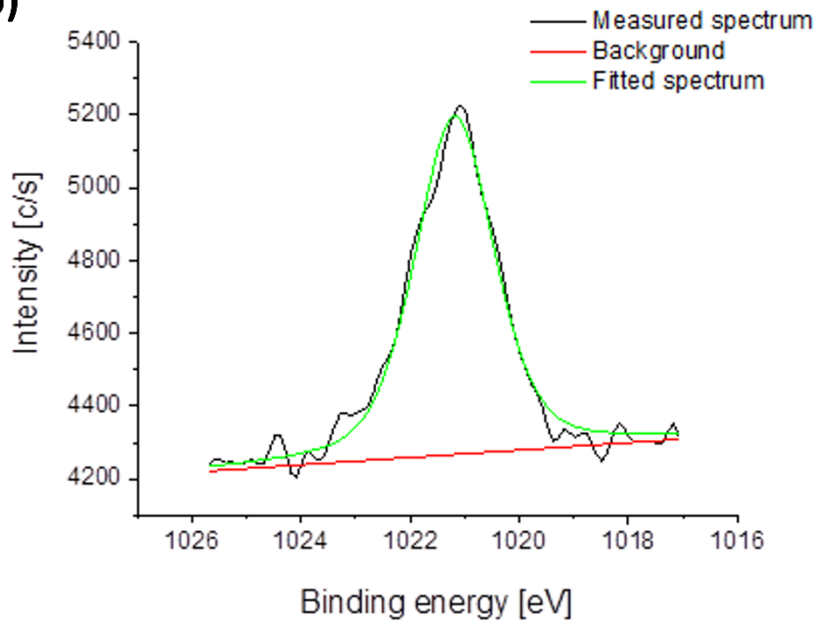
a)


SPION-Zn2-CCh(+)
SPION-CCh(+)
Intensity [c/s]
35000
30000
25000
20000
15000
10000
5000
0
1000
800
600
400
200
0
Binding energy [eV]

b)


Measured spectrum
Background
Fitted spectrum
Intensity [c/s]
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5200
5000
4800
4600
4400
4200
1026
1024
1022
1020
1018
1016
Binding energy [eV]

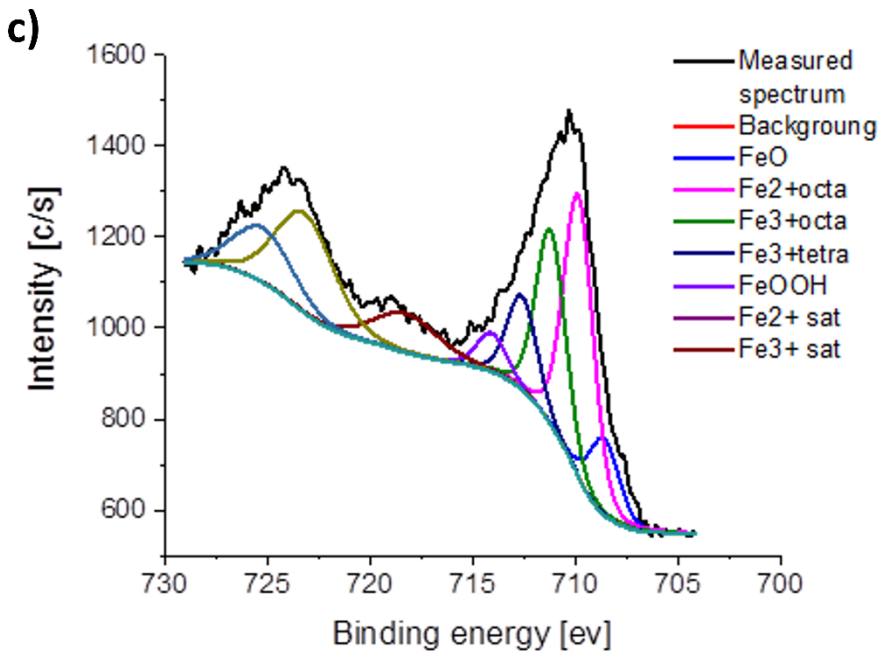


Figure S1. The XPS spectra of: (a) SPION-CCh(+) and SPION-Zn2-CCh(+), (b) Zn 2p3/2 band of SPION-Zn2-CCh(+); (c) deconvoluted Fe 2p band of SPION-Zn2-CCh(+).

Table S1. Elemental composition of the nanoparticles based on XPS measurements.

Samples	C1s	N1s	O1s	Fe2p3	Zn2p3	Zn/Fe
SPION-Zn	12.4	0.3	64.4	20.1	2.8	**0.14**
SPION	13.5	0.2	65.8	20.5	0.0	**0.00**
SPION-CCh(+)	42.5	4.4	40.6	12.5	0.0	**0.00**
SPION-Zn1-CCh(+)	31.5	2.1	51.3	13.8	1.3	**0.10**
SPION-Zn2-CCh(+)	36.5	3.5	48.4	9.6	2.0	**0.21**
SPION-Zn3-CCh(+)	53.7	4.5	35.1	5.5	1.3	**0.23**

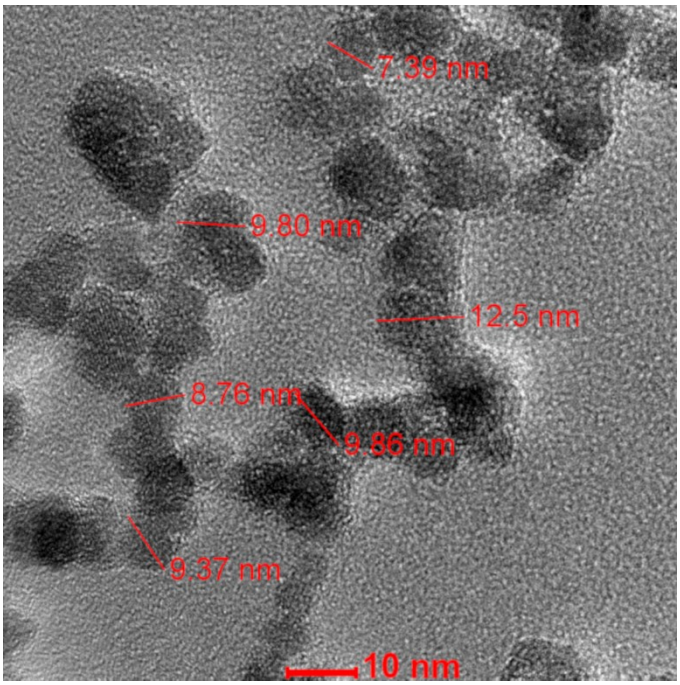
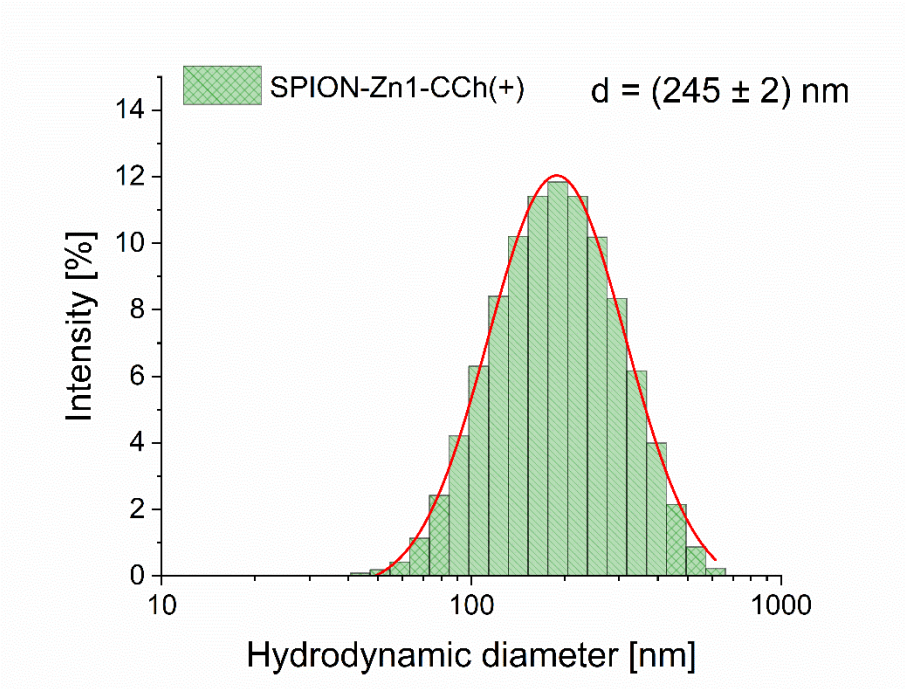


Figure S2. The exemplary HR TEM image for SPION-CCh(+).

a)



b)

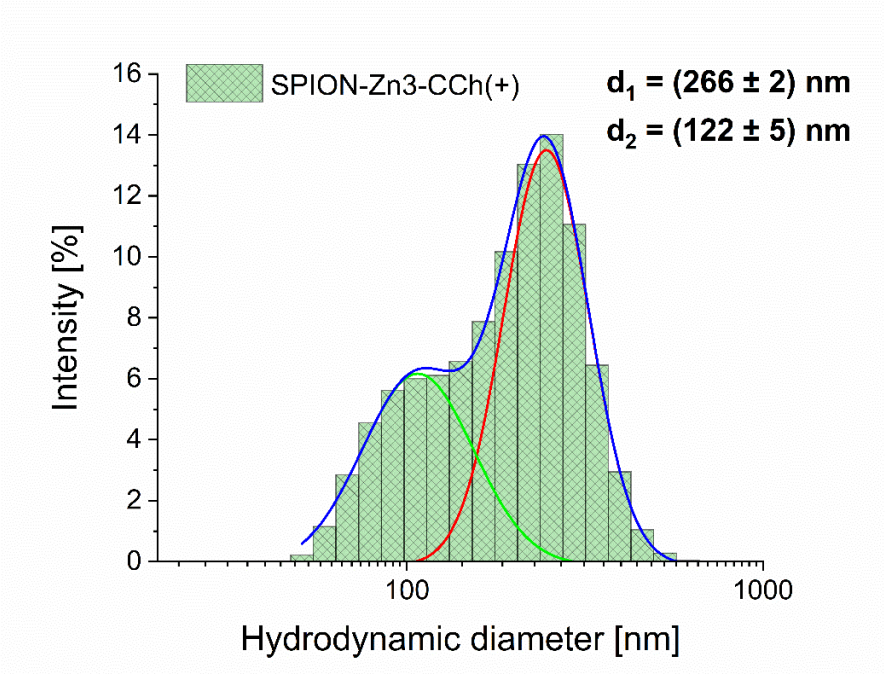
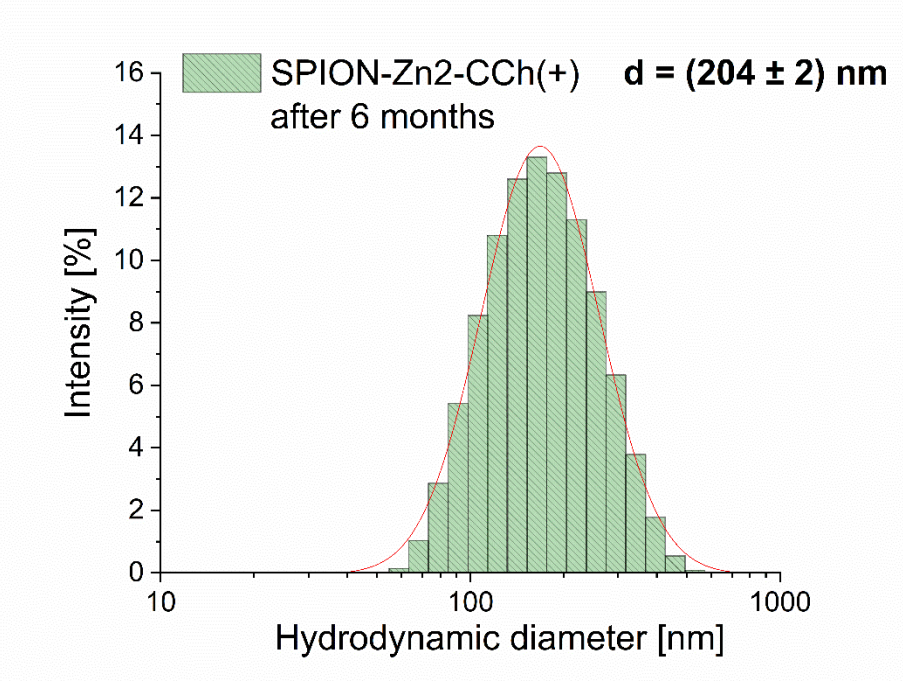


Figure S3. Size distributions by intensity of SPION-Zn1-CCh(+) (a) and SPION-Zn3-CCh(+) (b) as measured via DLS.

a)



b)

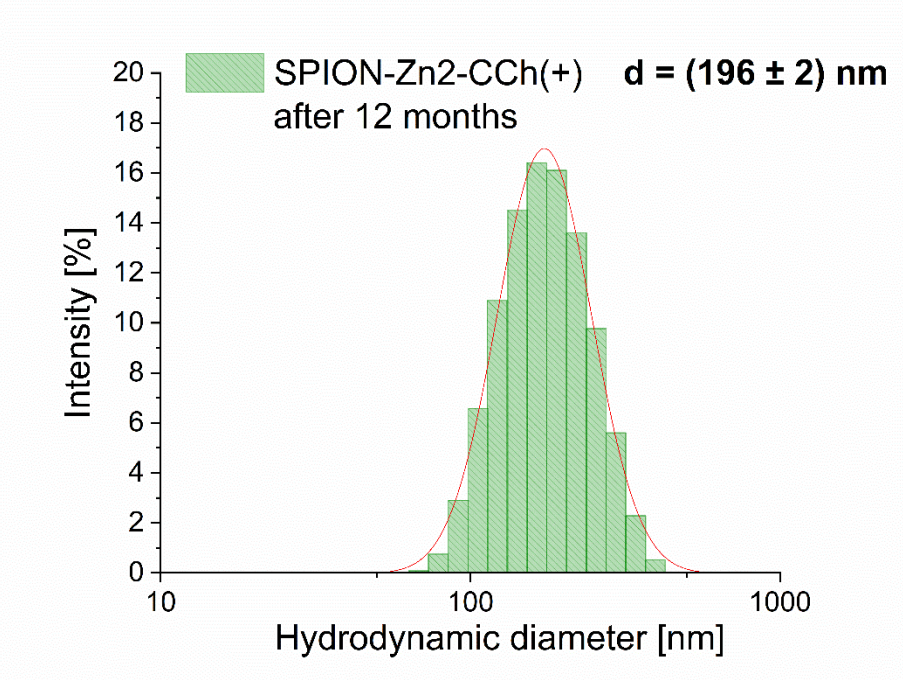
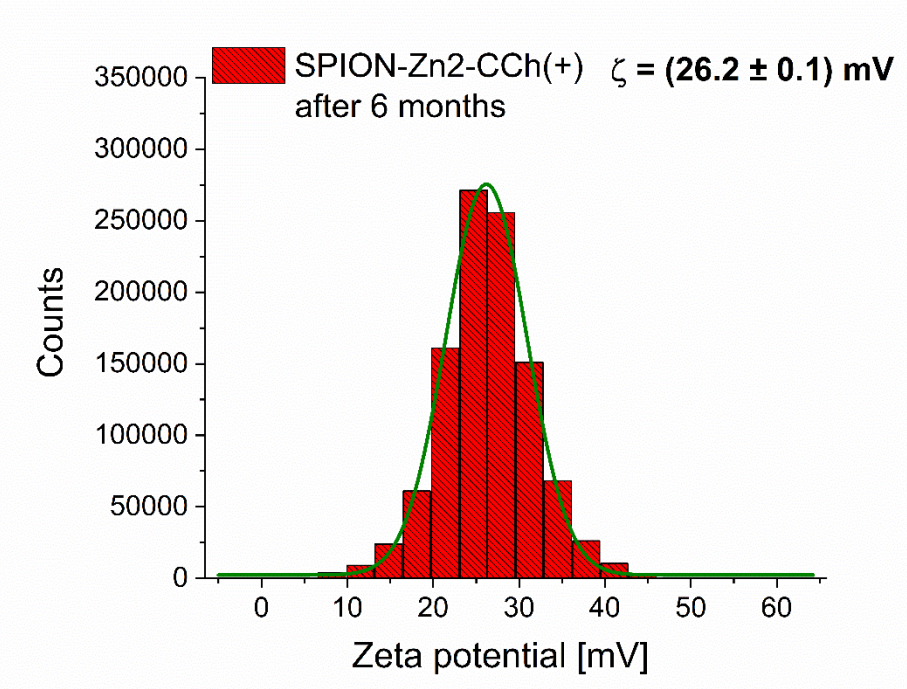


Figure S4. Size distributions by intensity of SPION-Zn2-CCh(+) after 6 months (a) and after 12 months (b) as measured via DLS.

a)



b)

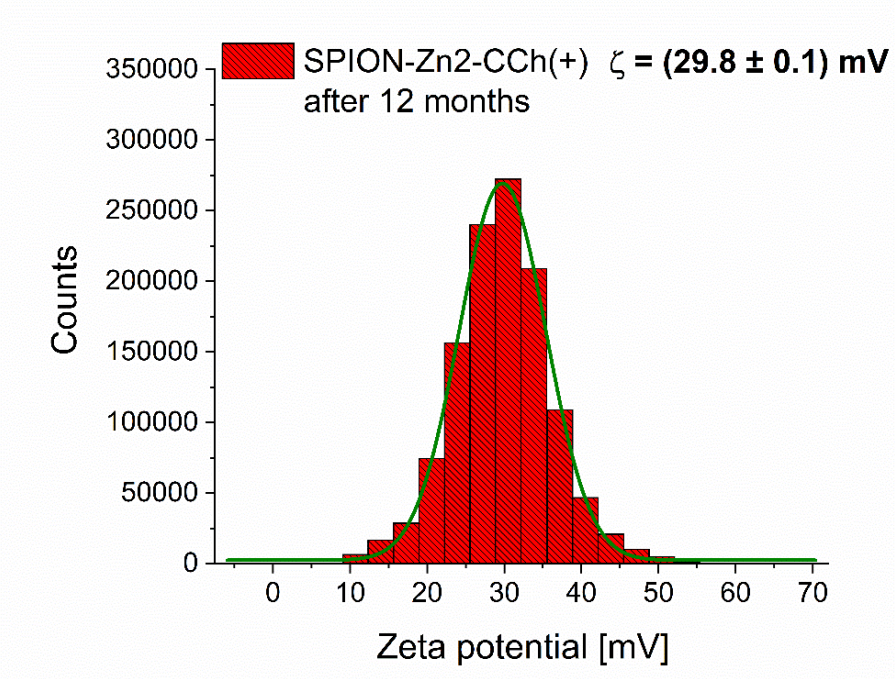


Figure S5. Zeta potential values of SPION-Zn2-CCh(+) after 6 months (a) and after 12 months (b).

Table S2. Mössbauer parameters for SPION-Zn2-CCh(+) nanoparticles: component contribution (Contrib.), isomer shift (IS) relative to ^{57}Co(Rh), magnetic hyperfine filed (H), quadrupole splitting (QS).

	No	Contrib. [%]	IS [mm/s]	H [kGs]	QS [mm/s]
T = 80K	1	28.9	0.374	493.3	0.017
	2	26.5	0.362	466.2	-0.123
	3	29.0	0.256	482.1	-0.007
	4	15.6	0.504	427.6	-0.023
<IS> =0.357 [mm/s] <H> = 472.6 [kGs]					

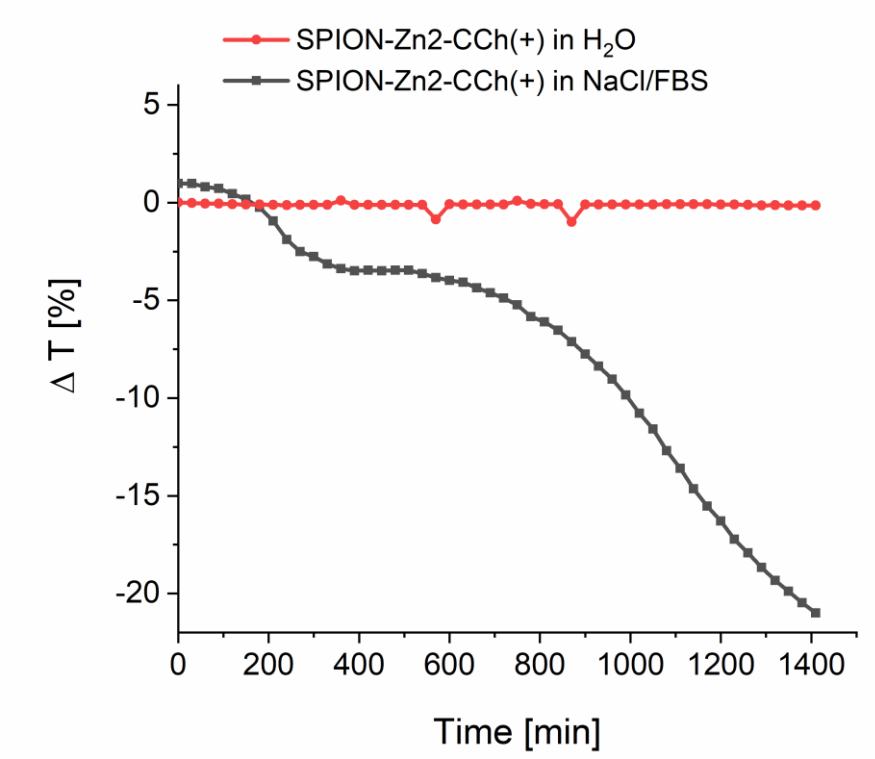


Figure S6. Variations of transmission of the dispersions of SPION-Zn2-CCh(+) in water (red) and serum solution (black) measured by Turbiscan analyzer.

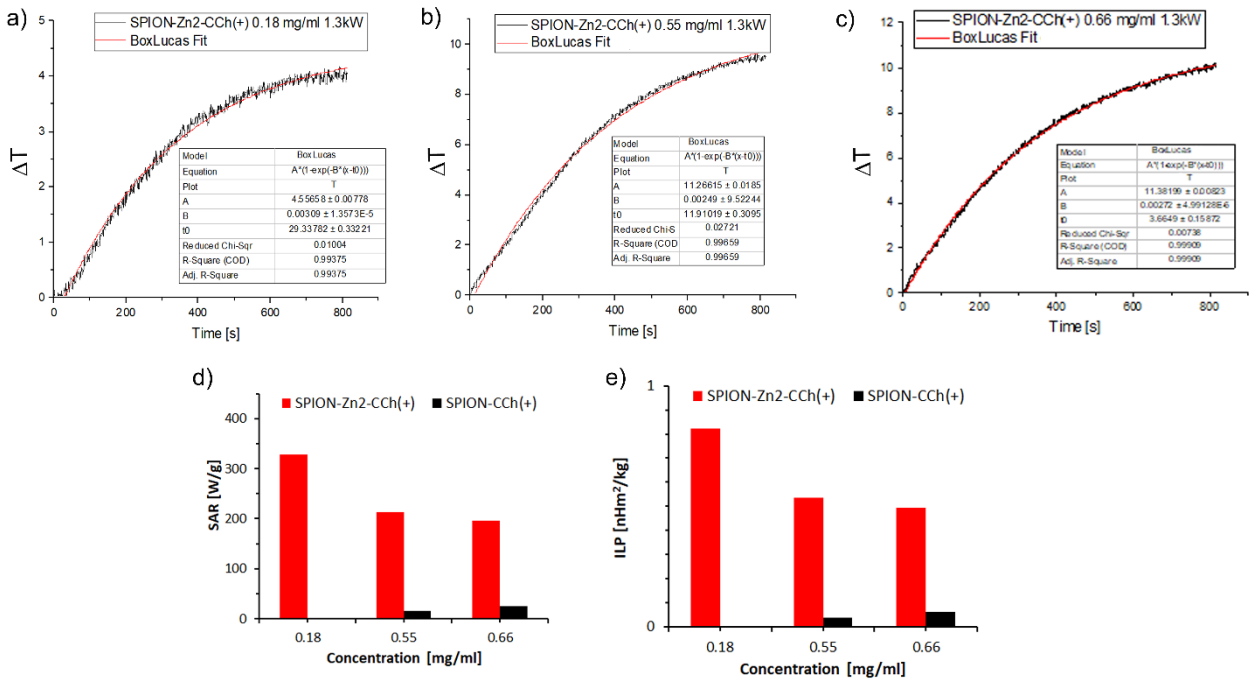


Figure S7. Example temperature rise profiles as a function of time resulted from the hyperthermic experiments and the respective fitting using the Box-Lucas model for SPION-Zn2-CCh(+) dispersions at the fixed power (1.3 kW) for three concentrations of iron (0.18, 0.55 and 0.66 mg/mL) (a-c); the red lines represent fitting of the data with the Box–Lucas curve (eq. 2); (d-e) SAR and ILP values calculated based on the Box-Lucas method.

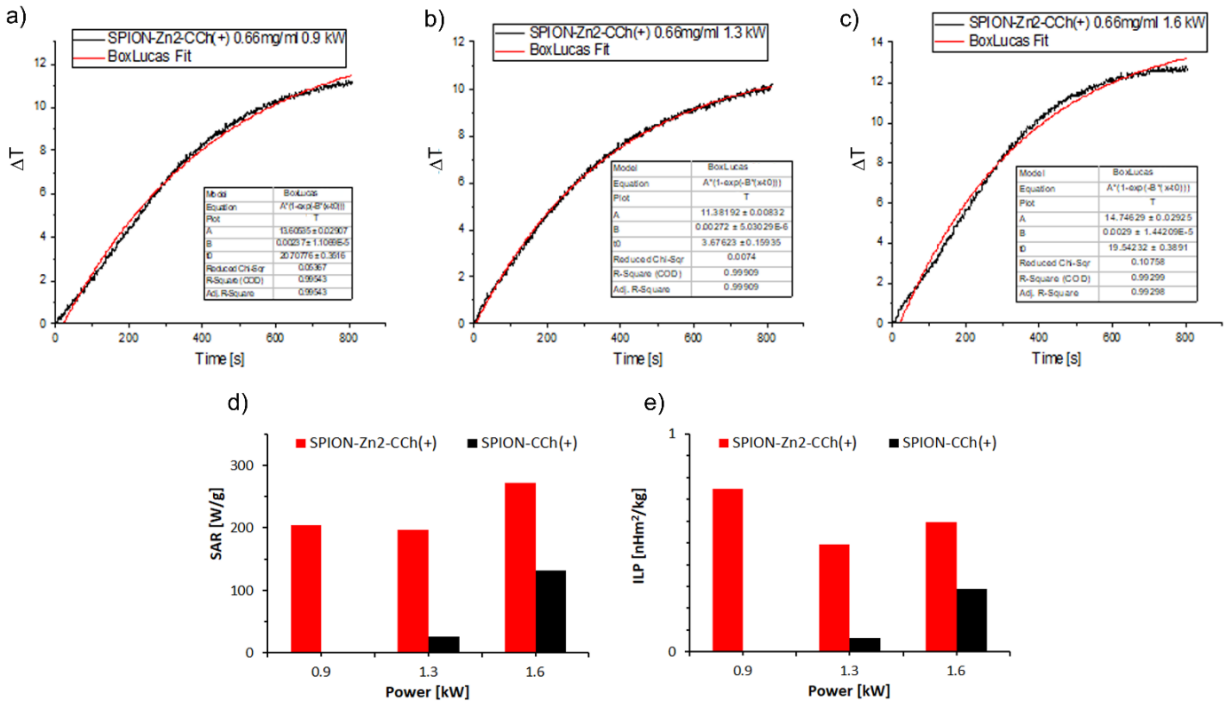


Figure S8. Example temperature rise profiles as a function of time resulted from the hyperthermic experiments and the respective fitting using the Box-Lucas model for SPION-Zn2-CCh(+) dispersions at various generator powers (0.9, 1.3, 1.6 kW) for the concentration of iron equal to 0.66 mg/mL (a-c); the red lines represent fitting of the data with the Box–Lucas curve (eq. 2); (d-e) SAR and ILP values calculated based on the Box-Lucas method.