Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Electronic supplementary information for:

Aqueous synthesis of polyhedral "brick-like" iron oxide nanoparticles for hyperthermia and T_2 MRI contrast enhancement

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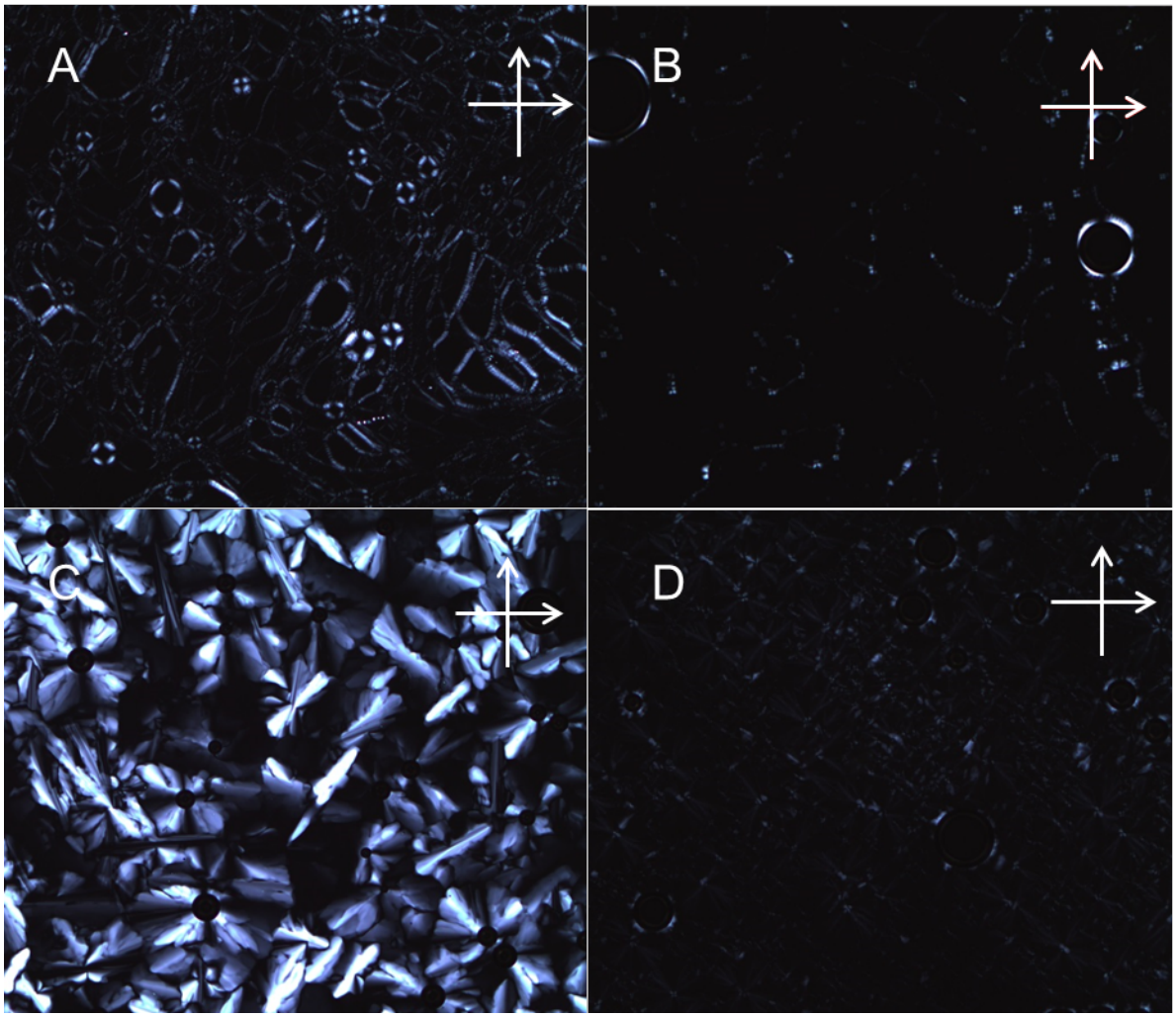
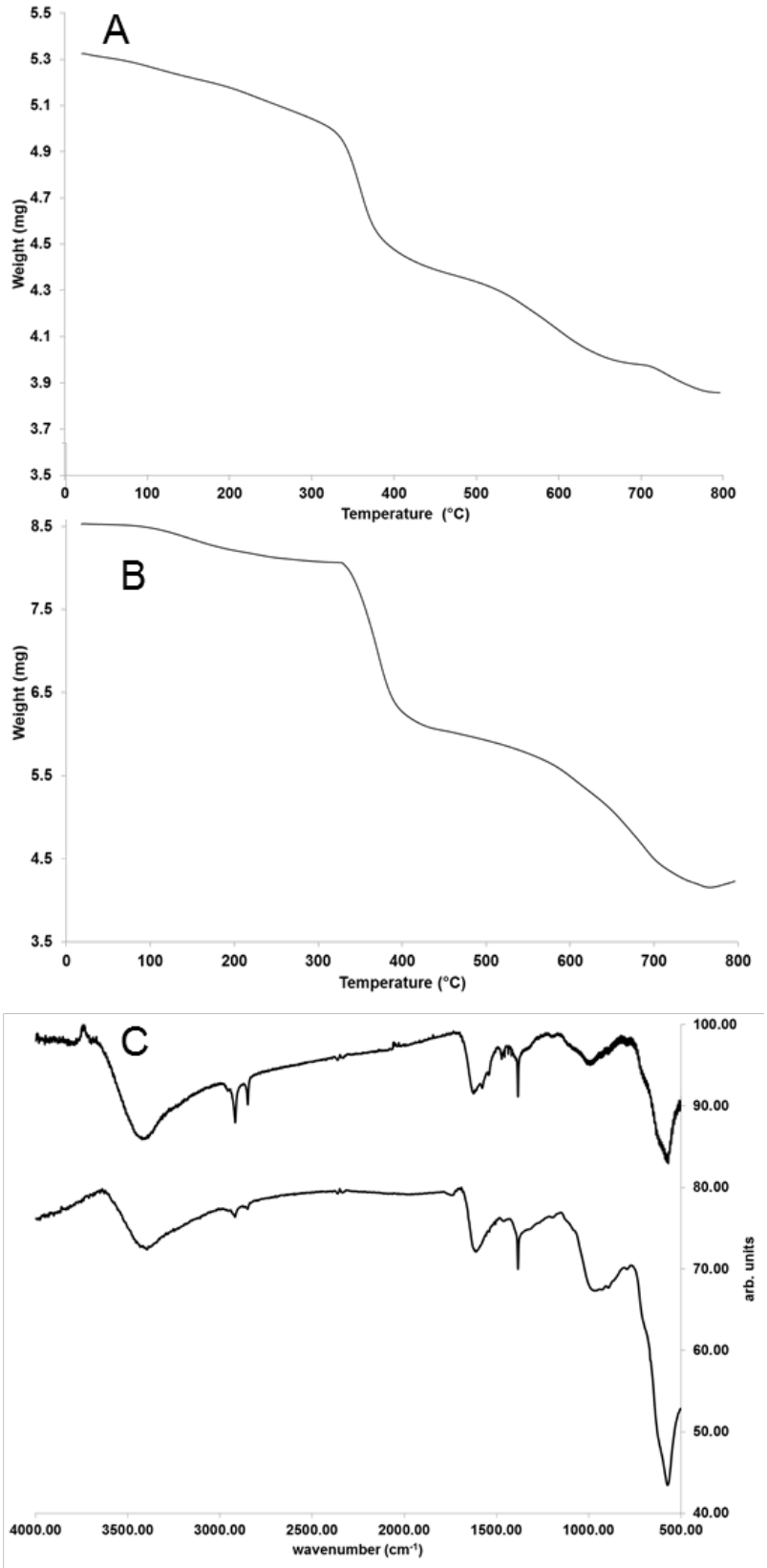
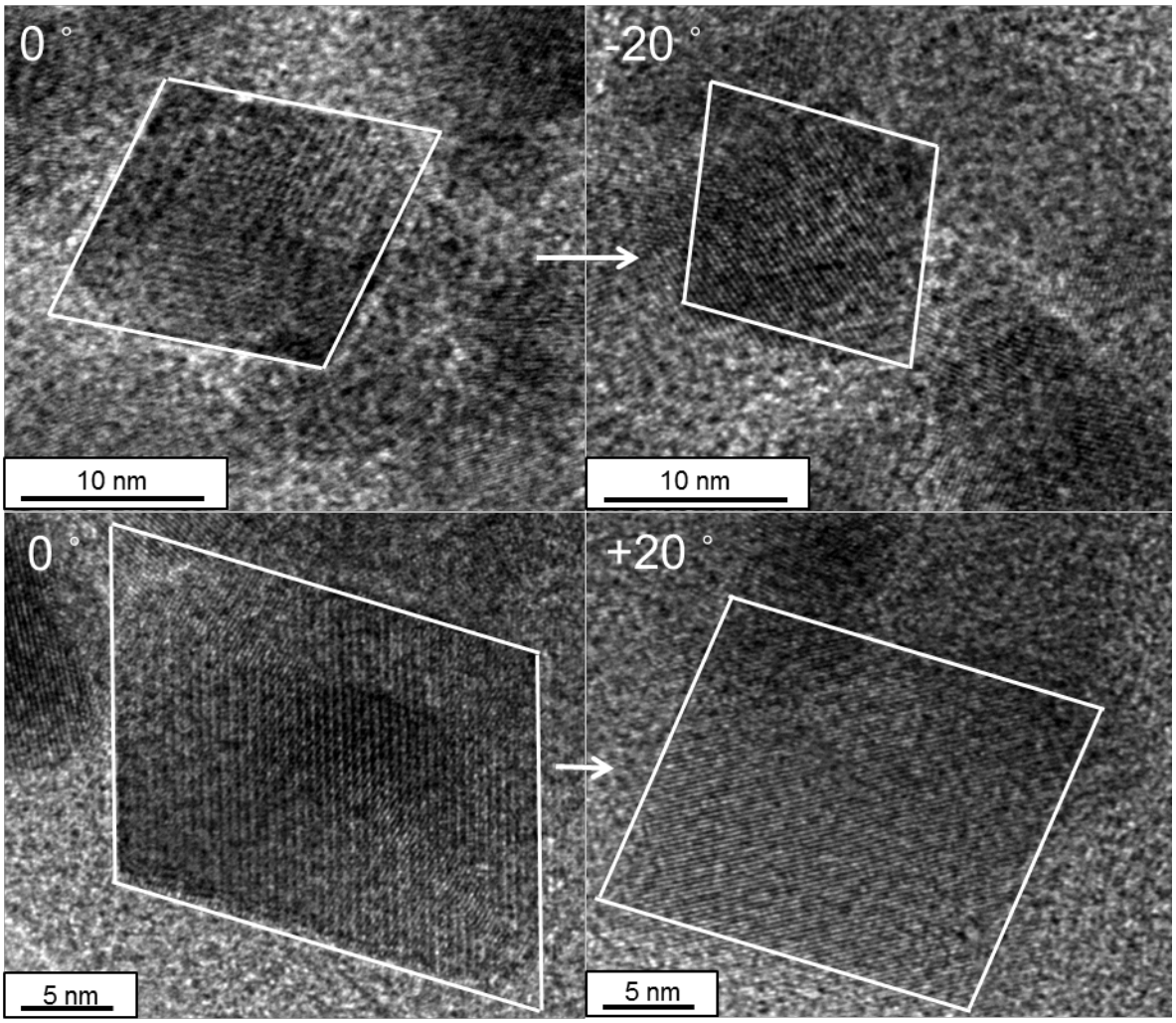


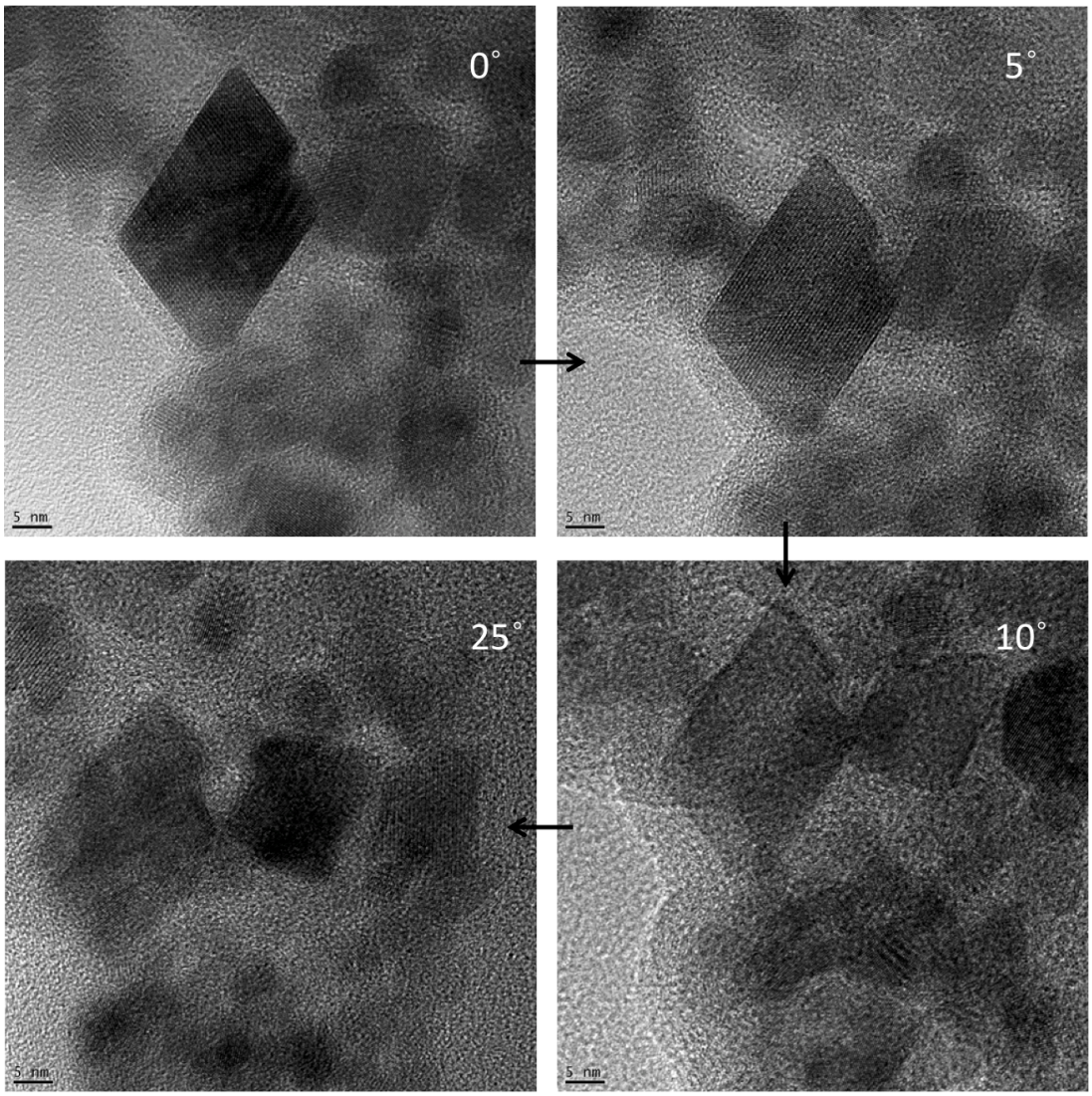
S1: POM images under crossed polarizers showing birefringent textures of lyotropic phases. **A** shows an image of a 50% mixture of Triton X45 in water at 35 ˚C; **B** shows the same along with a 2:1 mixture of $FeCl_3$ and $FeCl_2$, which represents the condition of the reaction mixture before hydrolysis with NaOH occurs. Fingerprint textures typical of a lamellar phase can be seen in both. **C** shows an image of a 50% mixture of Triton X100 in water at 30 ˚C; **D** shows the same along with a 2:1 mixture of $FeCl_3$ and $FeCl_2$. Focal conic textures typical of a hexagonal phase can be seen in both (limited transmission due to presence of iron salts), although the inclusion of the iron precursors does lower the transition temperature slightly.

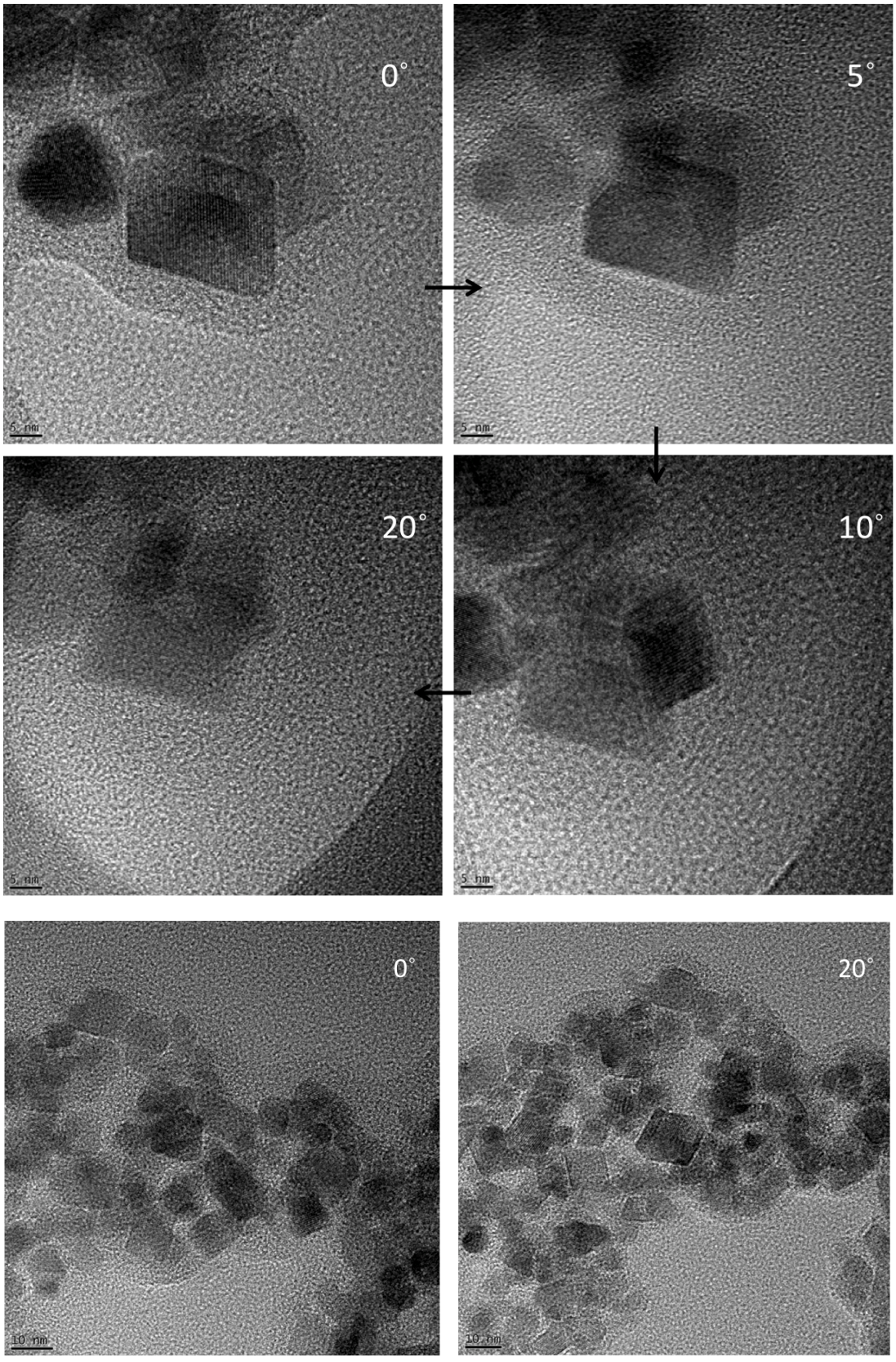


S2: FT-IR and TGA data for ***S*-IONBs**. Figures A and B show weight-loss *vs*. temperature profiles of ***S*-IONBsX100** (~27% weight loss) and ***S*-IONBsX45** (~46% weight loss), respectively. Figure C shows FT-IR spectra of ***S*-IONBsX45** (top) and ***S*-IONBsX100** (bottom). The broad peaks centered at ~3400 cm^{-1} corresponds to O-H stretching; the sharp speaks at ~2915 and ~2852 cm^{-1} correspond to C-H stretching; the broad peaks at ~1600 cm^{-1} are indicative of COO- stretching; the broad peaks centered around ~1000 cm^{-1} are due to Si-O-R stretching; and the large asymmetric peak at ~590 cm^{-1} correspond to stretching modes associated with Fe^{2+}-O and Fe^{3+}-O.



S3: TEM images showing particles from **IONBsX45** at different viewing angles. The top left set shows a typical rhombohedral particle, and the top right shows the same particle when viewed at an alpha (in plane) tilt of negative 20˚. The bottom left shows a different rhombohedral particle, and the bottom right shows the same particle when viewed at an alpha (in plane) tilt of positive 20˚. Both sets of images demonstrate how changes in viewing angle change the apparent internal angles of the particles and thus affect the evaluation of the particle morphology.


0°
5°
10°
25°
5 nm
5 nm
5 nm
5 nm


0°
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10 nm
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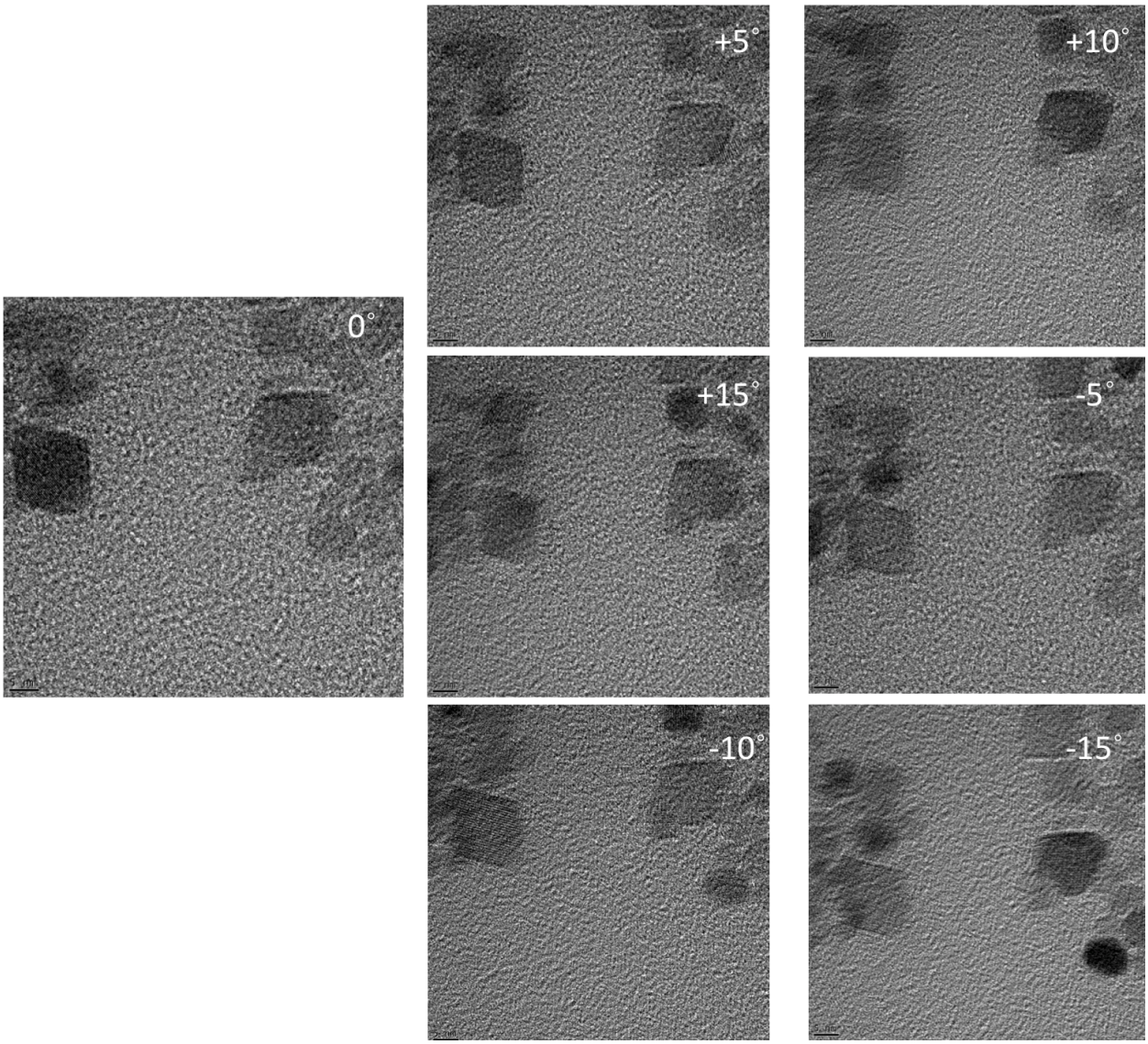
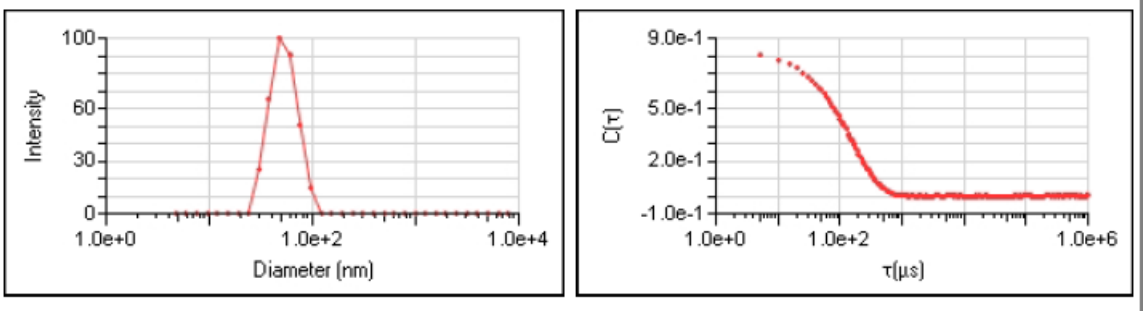
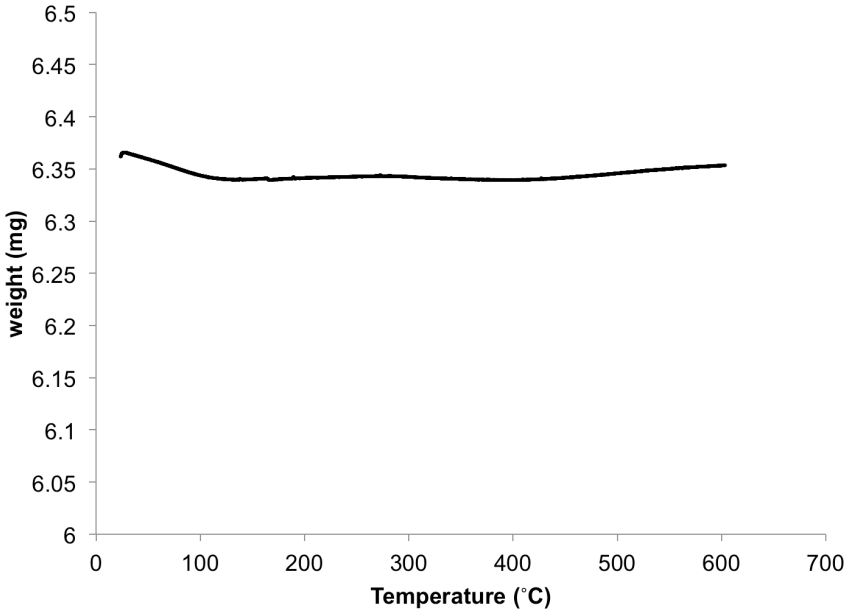


S4: Additional TEM images showing particles from **IONBsX45** at different viewing angles as indicated in the individual images (tilting is from left to right with respect to the images shown.

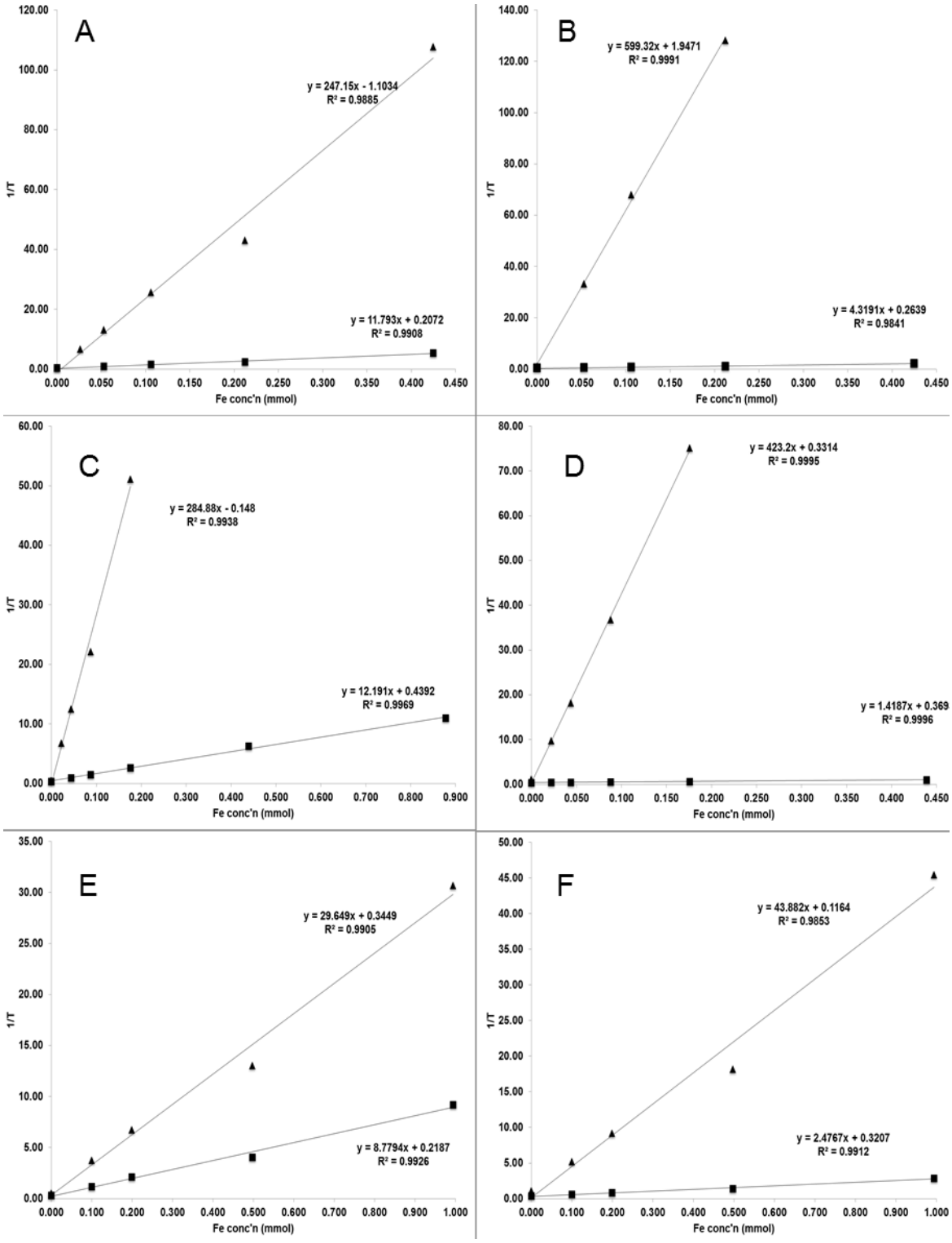
Sample		Results	
Type:	DLS	Eff. Diam. (nm):	50.24
Sample ID:	B2P97 EDT-IONCs in water ph 10 - 3	Polydispersity:	0.088
Operator ID:	Unknown Operator		
SOP ID:	Matt		
Start Date/Time:	1/30/2014 4:12:35 PM		
Notes:			



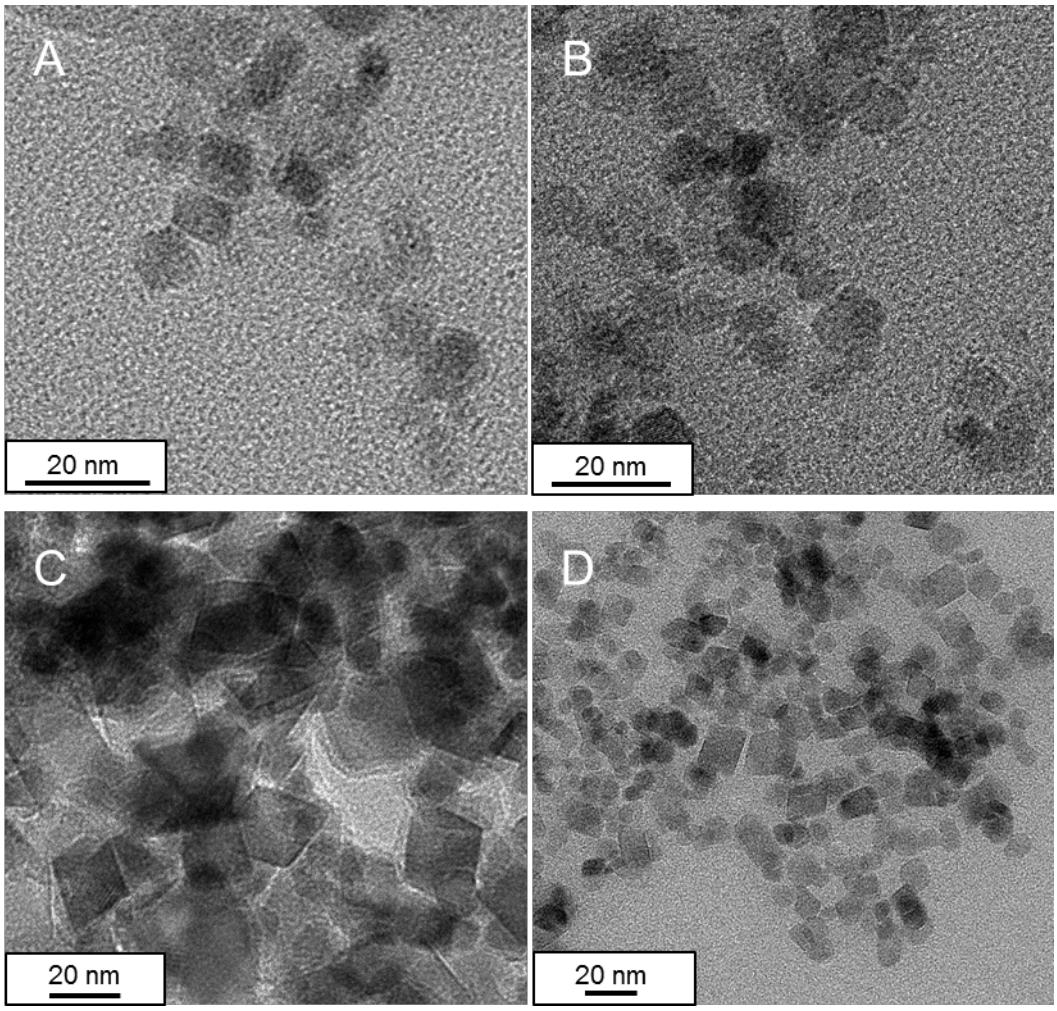
S5: DLS output file showing a plot of the size distribution of ***S*-IONBsX45** in water.



S6: TGA plot of bare **IONBsX45** (dried in a vacuum oven for 2 hours prior) showing effectively no weight loss, i.e. all surfactant molecules from the synthesis are washed off prior to conversion into the silanized IONBs (***S*-IONBs**).



S7: Plots used to determine relaxivity values for various particles. *y*-Axes show the inverse of the relaxation time; *x*-axes show Fe concentration in mM. Figures A and B are for ***S*-IONBsX100** at 1.5 T and 7 T, respectively; C and D are for ***S*-IONBsX45**; E and F are for ***S*-IONPs**. Triangle markers correspond to $1/T_2$ values; square markers correspond to $1/T_1$ values. Equations for determining the slope of each line are included in the inset for each plot.



S8: TEM images of ***S*-IONBsX100** (A, B), and ***S*-IONBsX45** (C, D).