

Supporting Information

Iron nitride and carbide: from crystalline nanoparticles to stable aqueous dispersions

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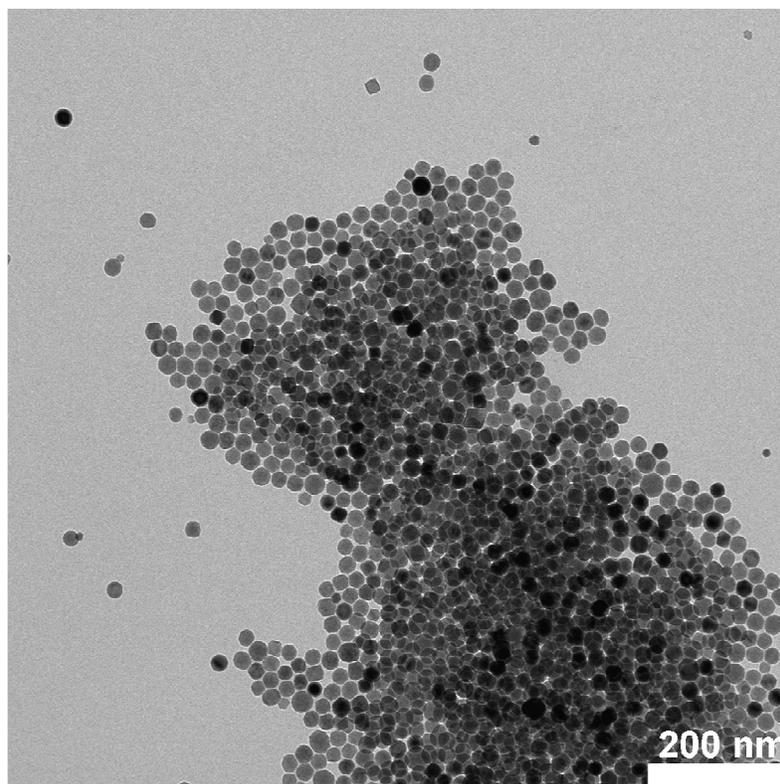


Figure S1: TEM image shows the iron oxide template particles.

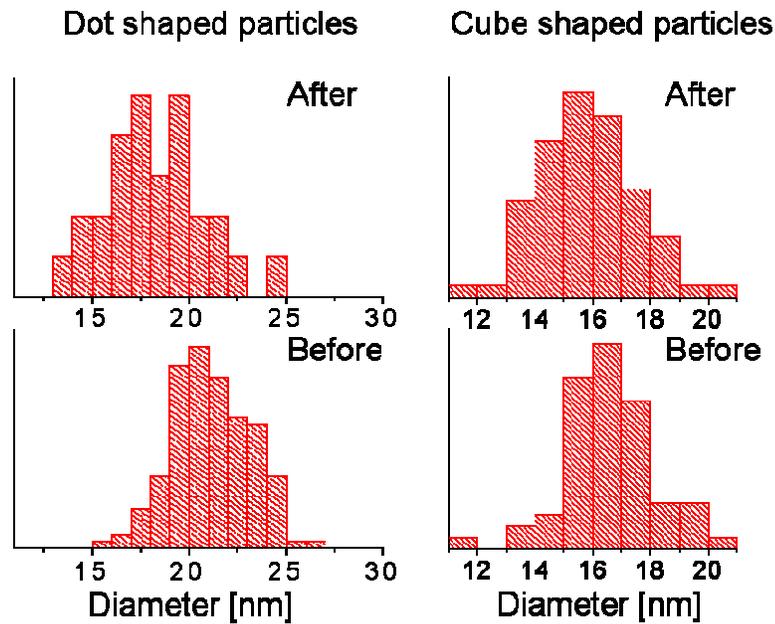


Figure S2: Histograms of the particles before and after the conversion from iron oxide into iron nitride and carbide of spherical particles (left) and cube-shaped particles (right).

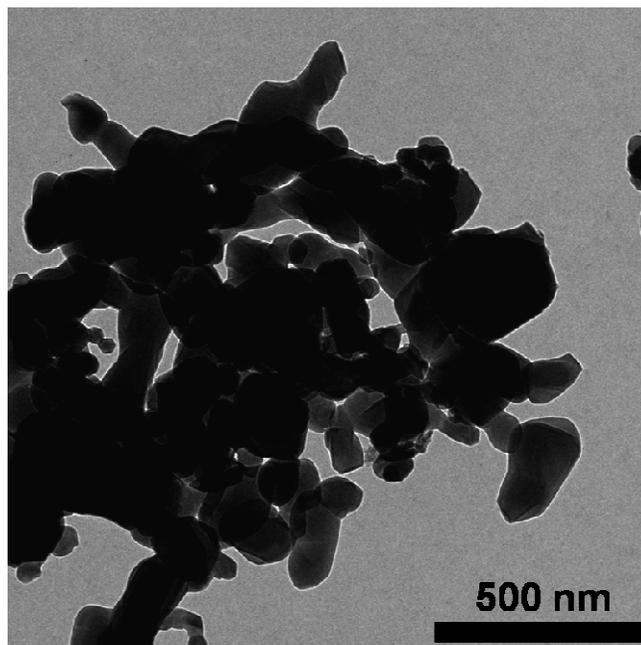


Figure S3: TEM images of iron oxide after heating the template particles to 800°C under nitrogen without further additives.

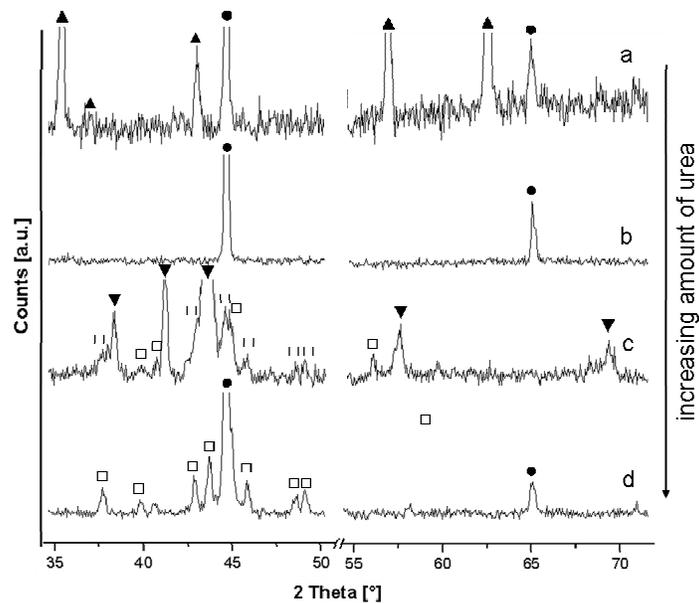


Figure S4: XRD pattern of the particles synthesized with different ratios of Fe_2O_3 :urea: a) 1:1, b) 1:5, c) 1:10 and d) 1:15. Fe_3O_4 (\blacktriangle , ICDD 00-019-0629), $\text{Fe}(0)$ (\bullet ; ICDD 04-007-9753), Fe_3C (\square , ICDD 00-035-0775), Fe_3N (\blacktriangledown , ICDD 04-007-2250).

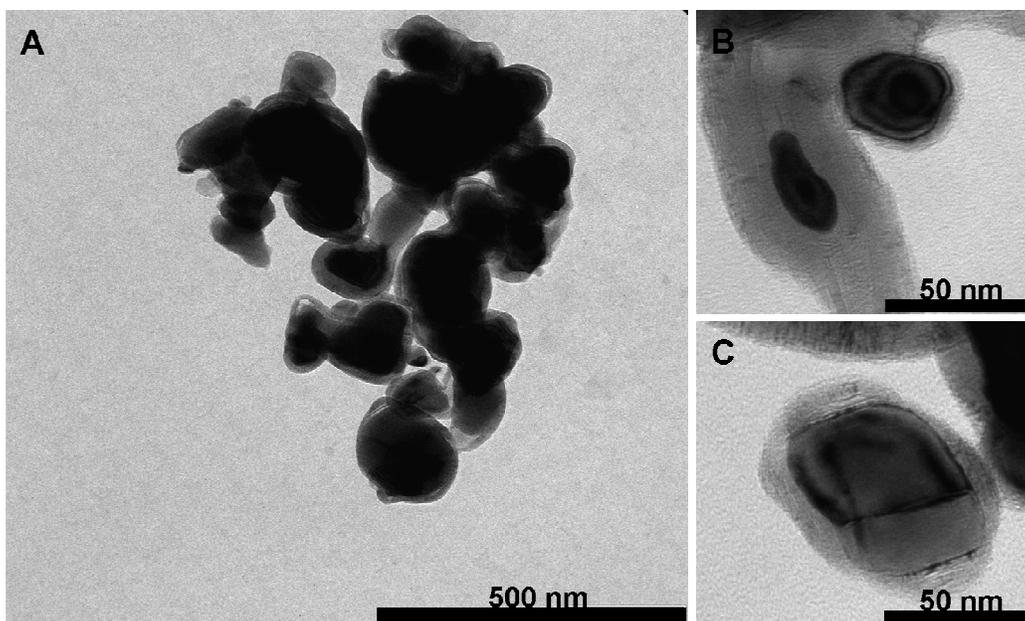


Figure S5: TEM images of particles synthesized at a final temperature of 700°C .

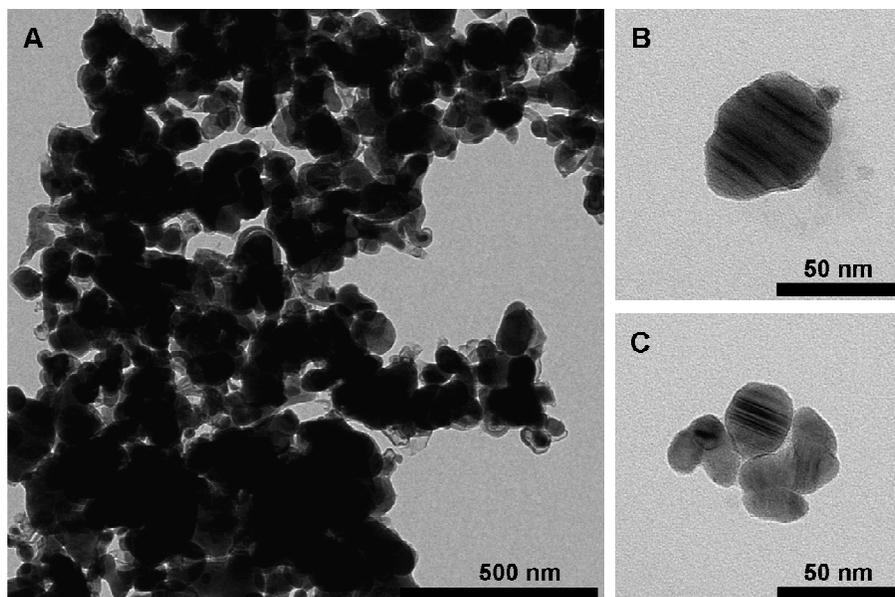


Figure S6: TEM images of particles synthesized at a final temperature of 800°C.

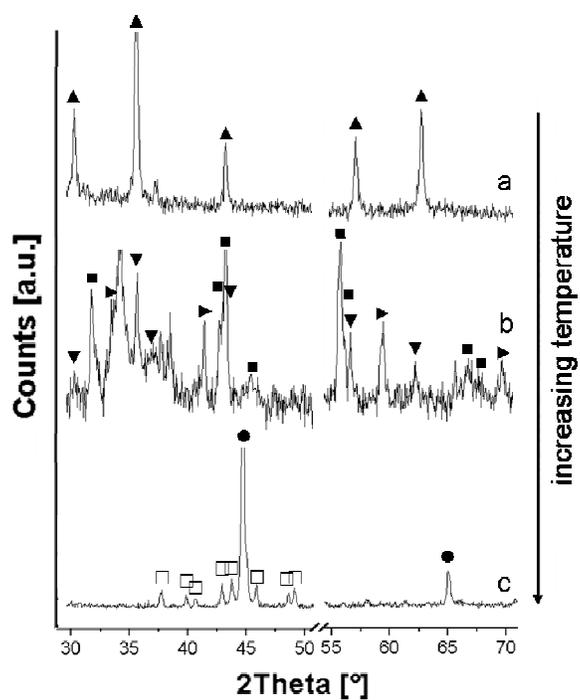


Figure S7: XRD pattern of the particles synthesized with a ratio of Fe_2O_3 : urea of 1:10 and a reaction temperature of a) 600°C, b) 700°C and c) 800°C. Fe_3O_4 (▲, ICDD 00-019-0629), $\text{Fe}(0)$ (●, ICDD 04-007-9753), $\text{Fe}_{2.93}\text{O}_4$ (▼, ICDD 04-009-2284), Fe_3C (□, ICDD 00-035-0775), Fe_2N (■, ICDD 00-050-0957), Fe_4N (►, ICDD 00-006-0627).

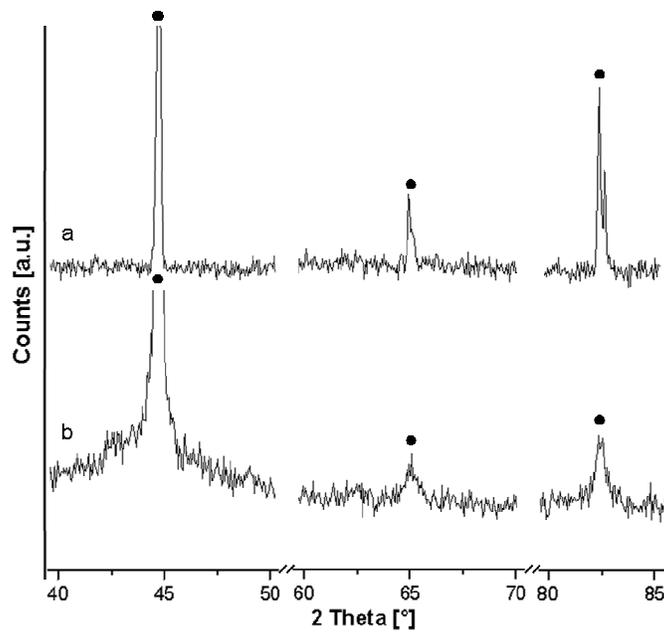


Figure S8: XRD pattern of the particles synthesized in the present of a) urea and b) agar. Fe(0) (●, ICDD 04-007-9753).

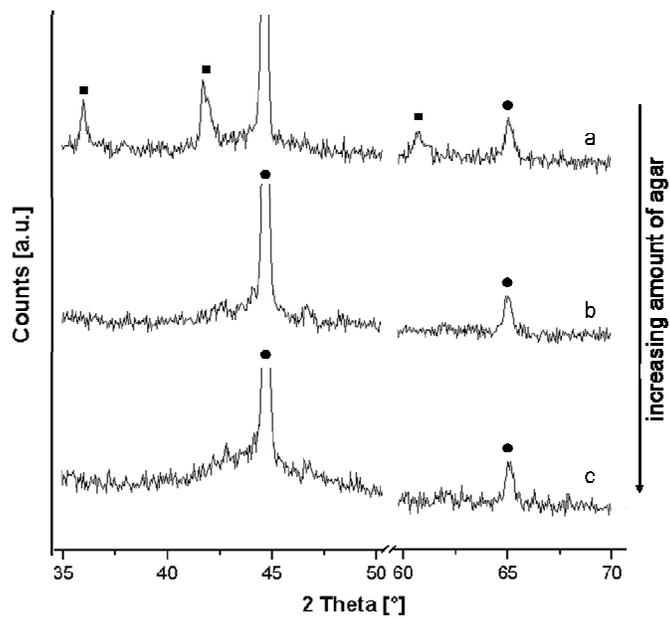


Figure S9: XRD pattern of the particles synthesized with different ratios of Fe₂O₃:agar: a) 1:10, b) 1:30 and c) 1:65. FeO (■, ICDD 04-005-9718), Fe(0) (●, ICDD 04-007-9753).

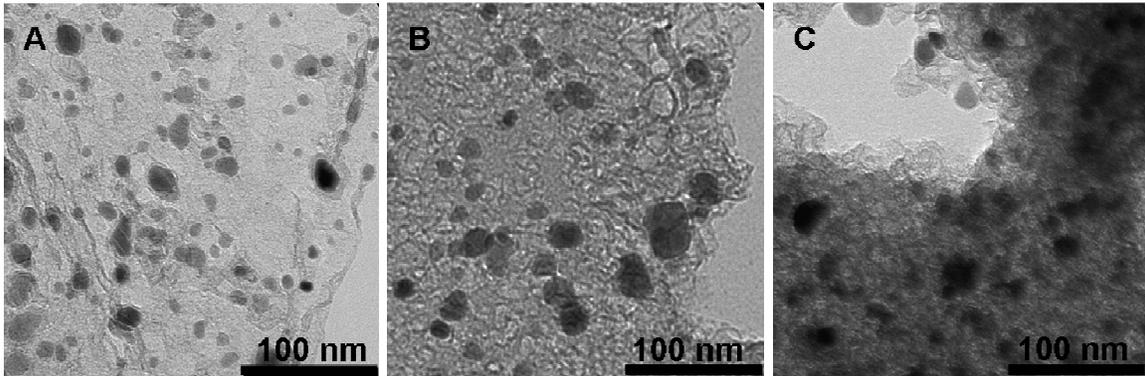


Figure S10: TEM images of the particles synthesized in the present of urea and different ratios of Fe₂O₃:agar: a) 1:1, b) 1:5 and c) 1:10

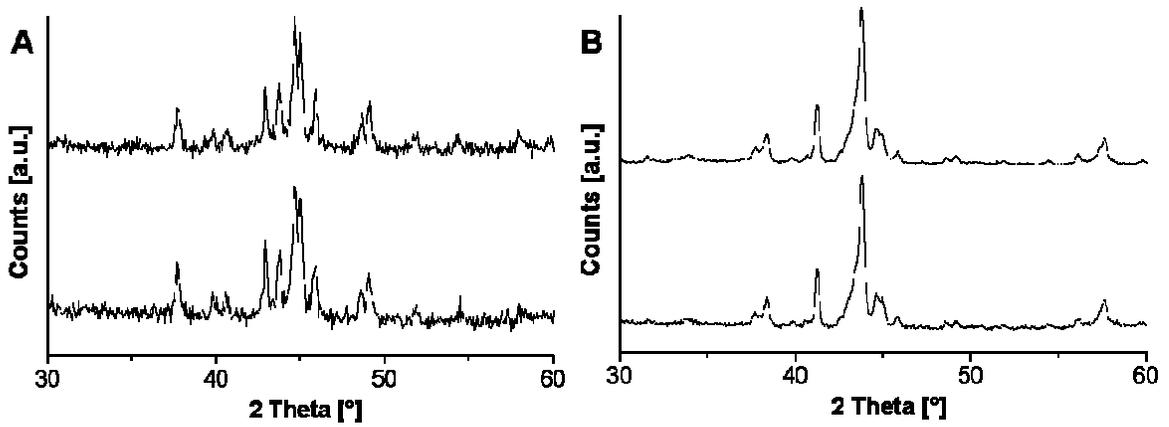


Figure S11: XRDs of the particles A) iron carbide (compare Figure 1d) and B) iron nitride particles (compare Figure S4c) before (top) and after (bottom) treatment with H₂O₂.

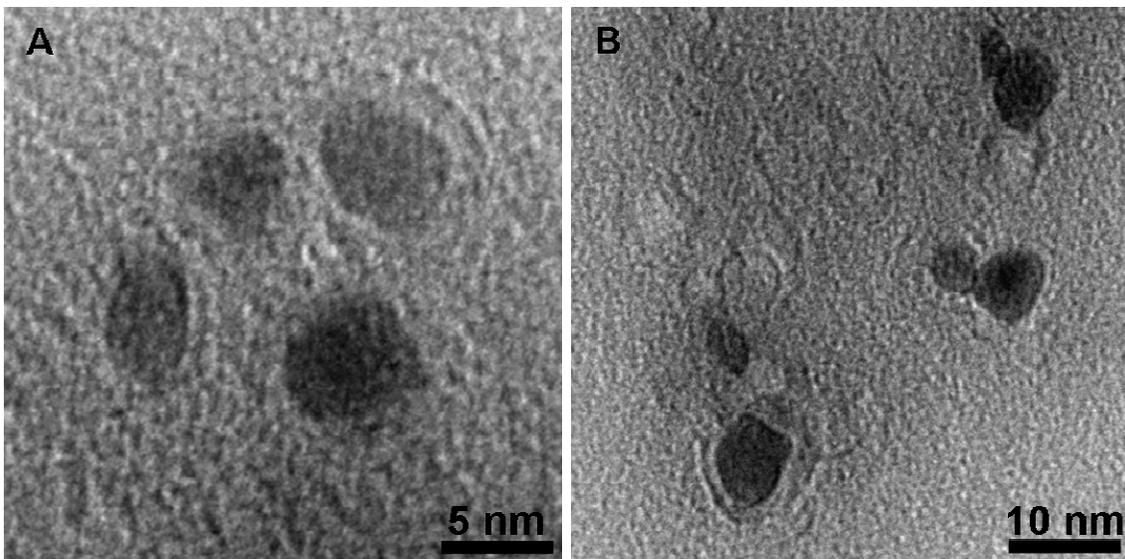


Figure S12: TEM images of the particles stabilized with PEVImBr.

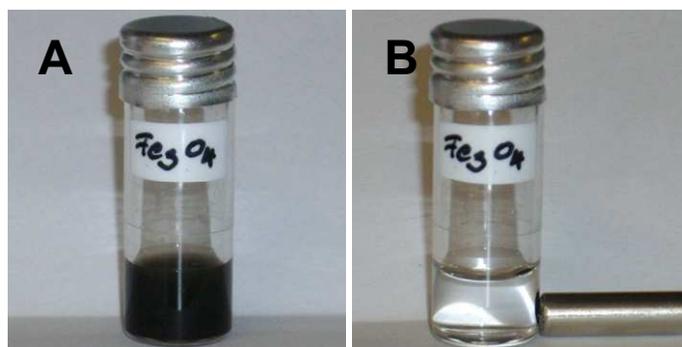


Figure S13: A) Images of a dispersion of the template particles without stabilizing agent. Here the particles start to precipitates after sonication was switched off. B) The same dispersion in the presence of a magnet.