Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.


# Supporting Information

## The role of the oleic acid on the synthesis of $Fe_{3-x}O_4$ nanoparticles over a wide size range

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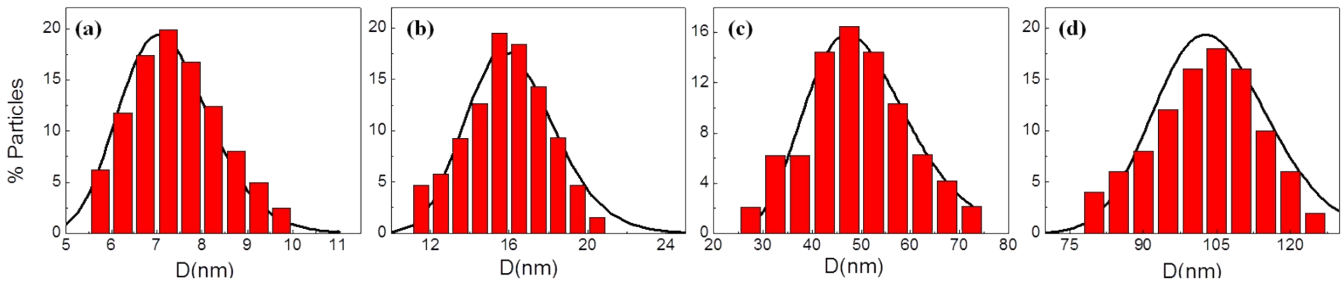


**Figure S1.** Histograms for the particle size of samples: (a) R1, (b) R2, (c) R3 and (d) R4.

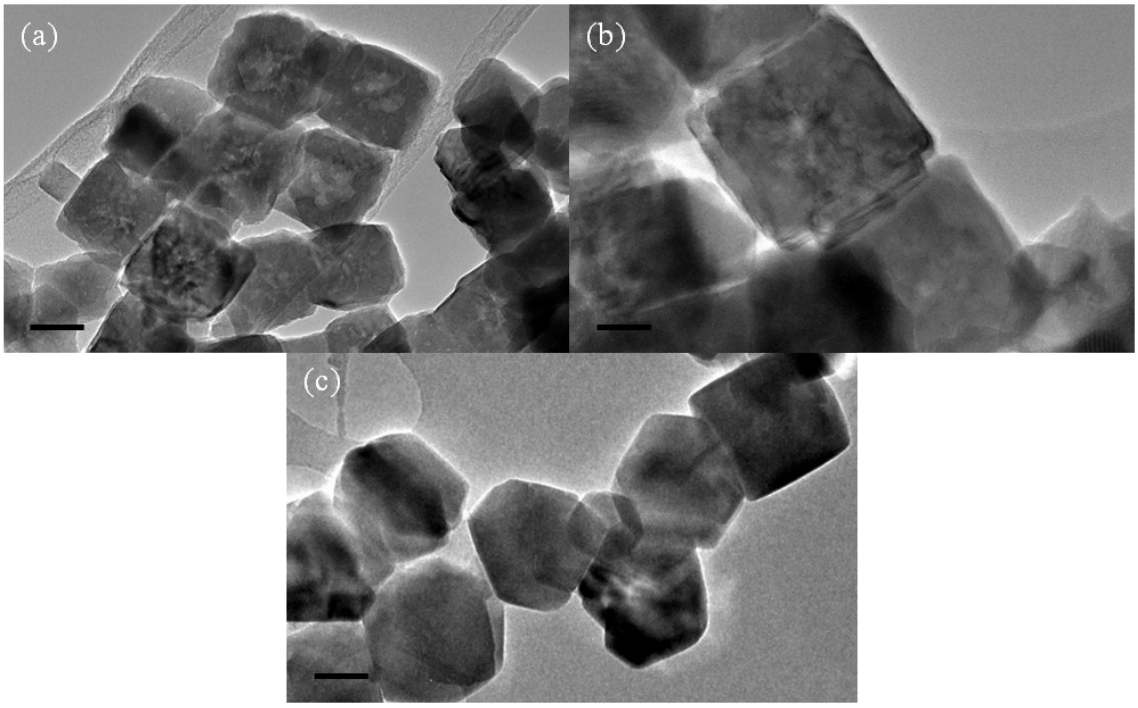


**Figure S2.** HRTEM images for samples with bigger NPs. (a) and (b) correspond to R3. (c) R4. Scale bars: (a) 30 nm, (b) 15 nm, (c) 50 nm.

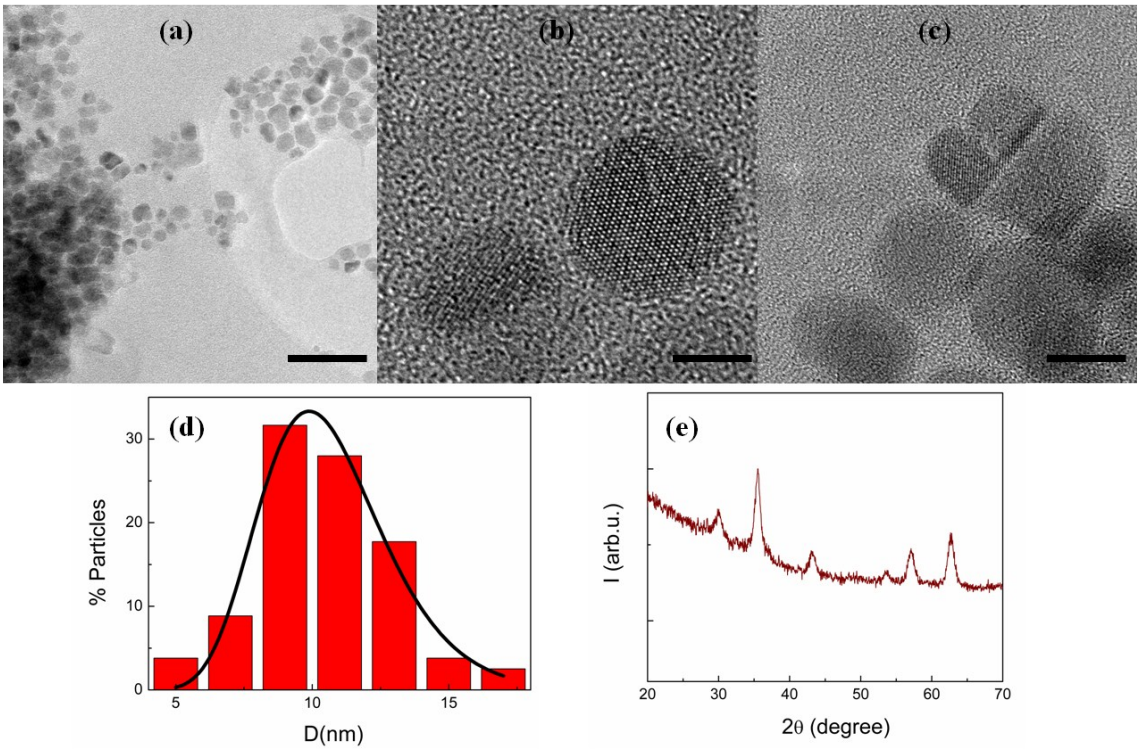


**Figure S3.** Structural characterization of sample R5. (a) TEM image at low resolution, (b) and (c) HRTEM images. Scale bars: (a) 50 nm, (b) 5 nm and (c) 7nm. (d) Particle-size distribution. (e) XRD spectrum of the sample.

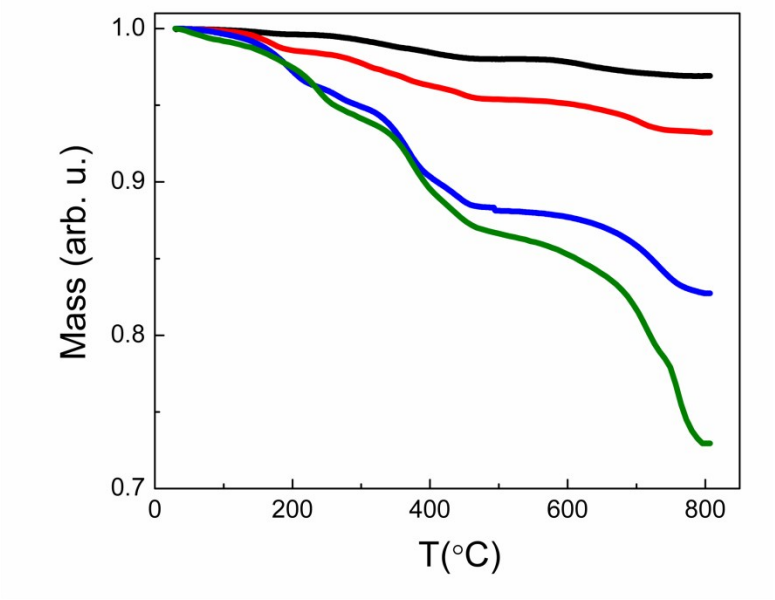


**Figure S4.** Thermogravimetric curves for the samples as follows: R1 (green solid line), R2 (blue solid line), R3 (red solid line) and R4 (black solid line).

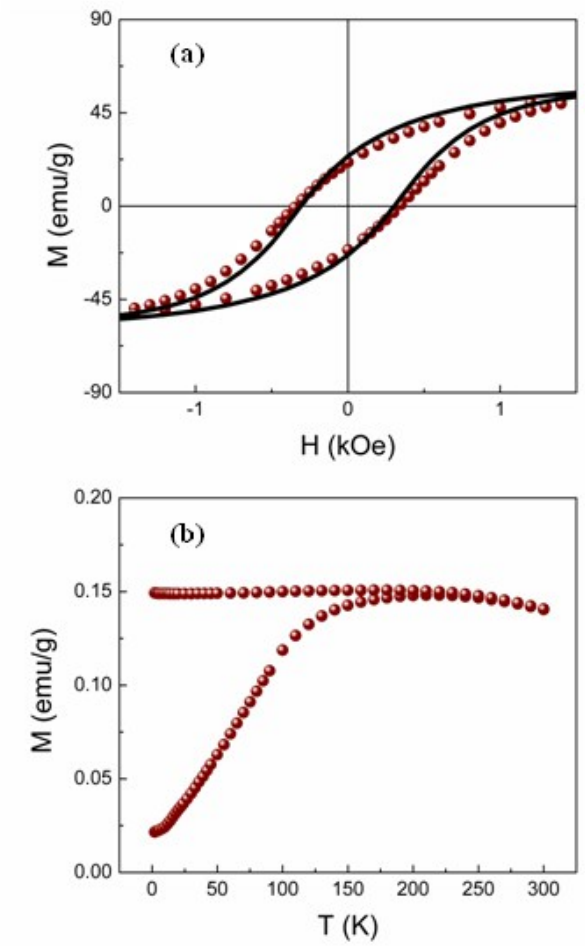


**Figure S5.** Magnetic characterization of the sample R5. (a) Hysteresis loop at 5 K (brown spheres) and after FC at 10 kOe (black solid line). (b) $M_{ZFC} - M_{FC}$ curves for the same sample.

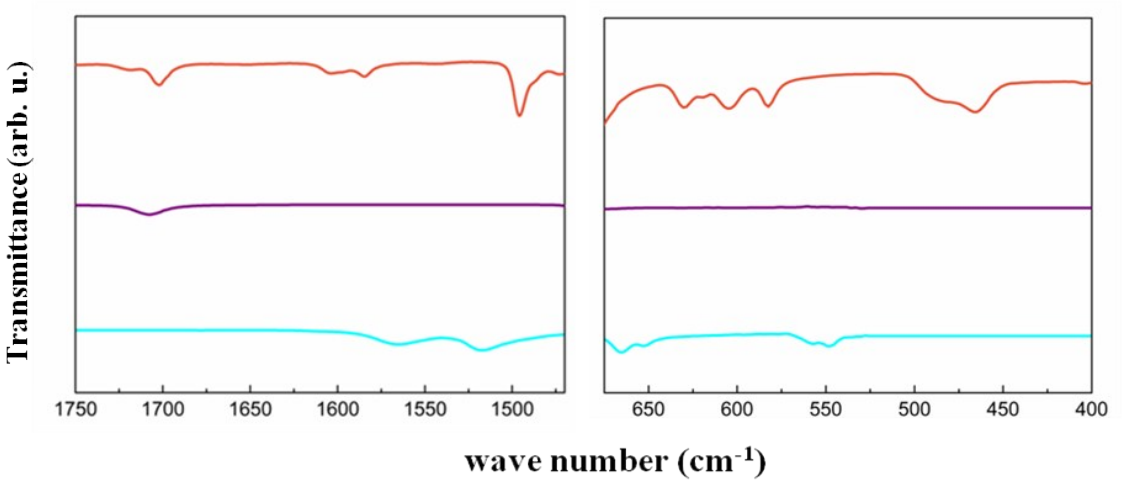


**Figure S6.** IR spectra of the reactants: $Fe(acac)_3$ (turquoise solid line), oleic acid (purple solid line) and benzyl-ether (red solid line).

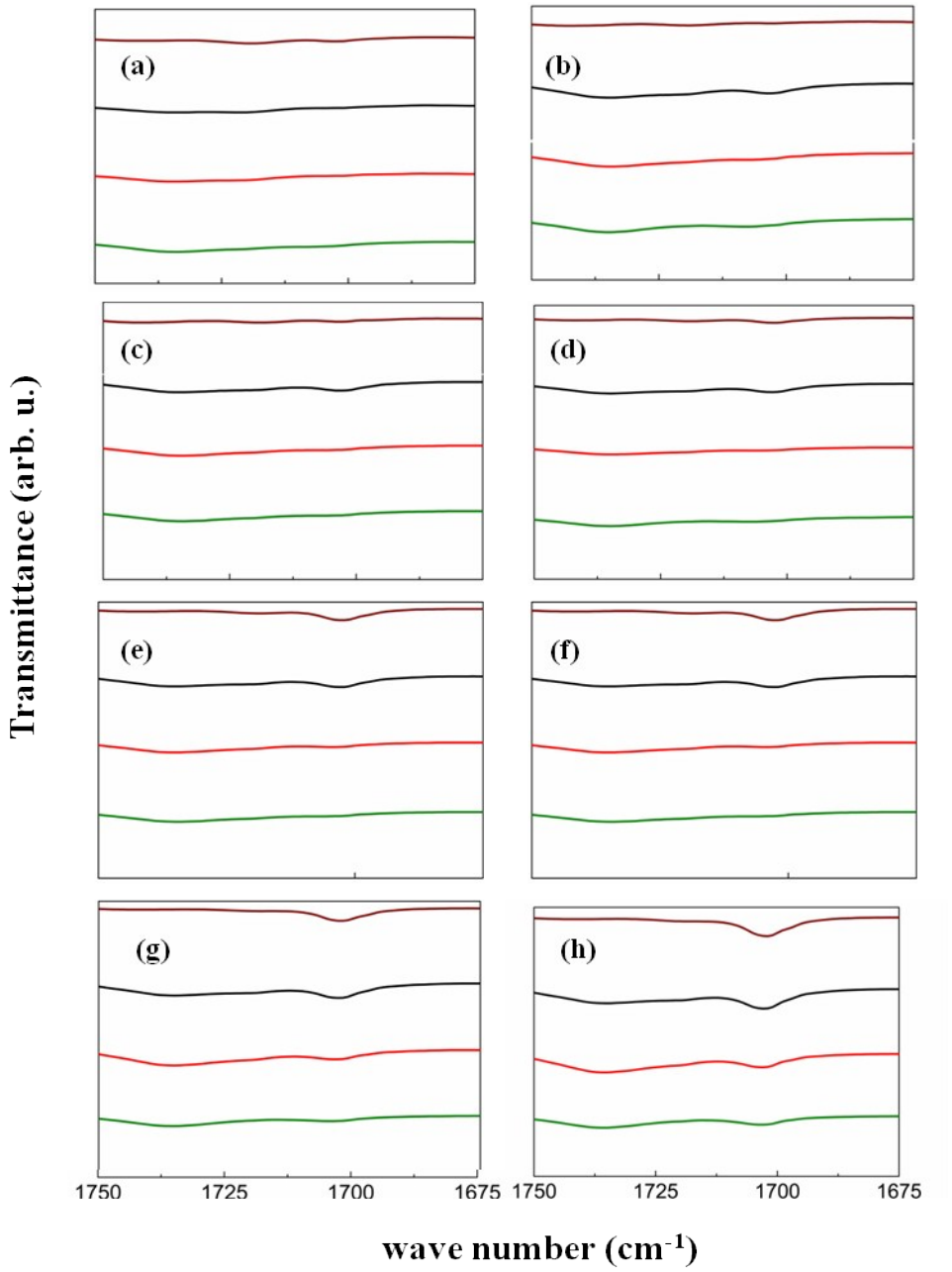


**Figure S7.** IR spectra for the reaction mixtures in the wave number range between 1750 and 1675 $cm^{-1}$ at (a) 200 ºC, (b) 210 ºC, (c) 220 ºC (d) 230 ºC, (e) 240 ºC, (f) 250 ºC, (g) 260 ºC and (h) 270 ºC. Curves are as follows: R1 (solid green line), R2 (solid red line), R4 (solid black line) and R5 (solid brown line).

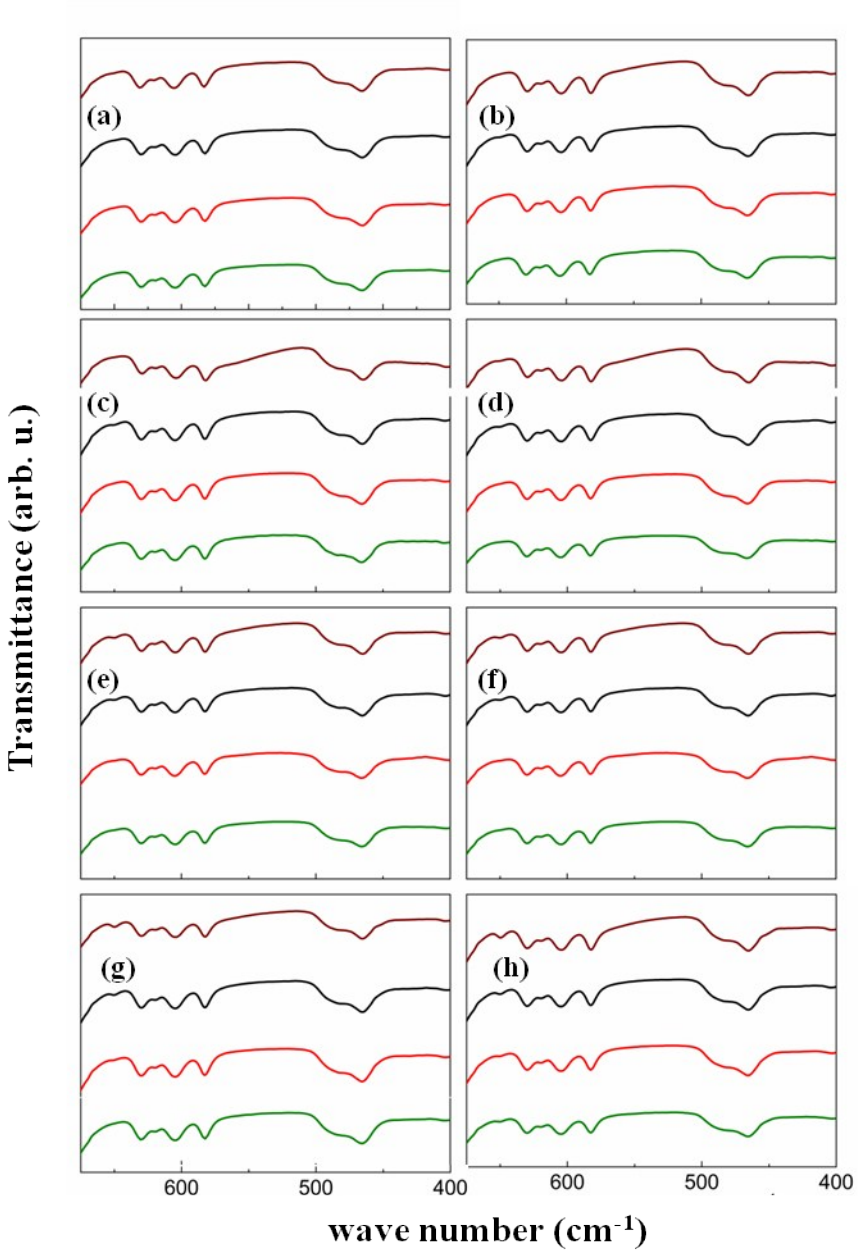


**Figure S8.** IR spectra for the reaction mixtures in the wave number range between 675 and 400 $cm^{-1}$ at (a) 200 ºC, (b) 210 ºC, (c) 220 ºC (d) 230 ºC, (e) 240 ºC, (f) 250 ºC, (g) 260 ºC and (h) 270 ºC. Curves are as follows: R1 (solid green line), R2 (solid red line), R4 (solid black line) and R5 (solid brown line).