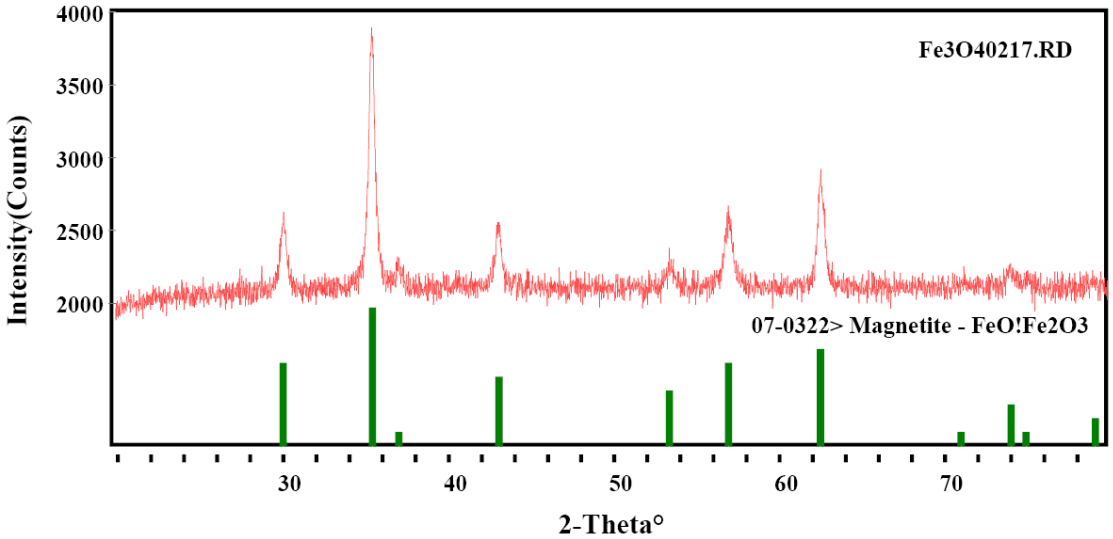
Supplementary Material (ESI) for Journal of Materials Chemistry

Supplementary information

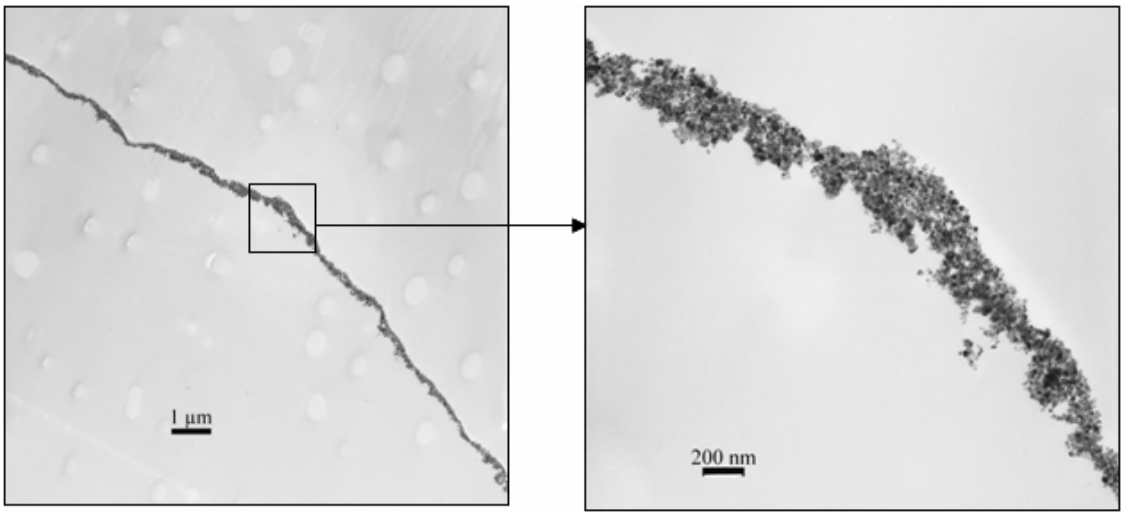
XRD



The suspension containing nanoparticles was settled down for 12 hours and approximately 80% of excess water was decanted. The remaining solution was frozen by liquid nitrogen and put in a freeze-dryer at a temperature of -50°C to get powder. The powder was characterized by Phillips EXPERT 1830 diffractometer with Cu K α radiation (2θ 0.02 degree/s from 20-80°) The obtained diffraction data were compared with the Joint Committee on Powder Diffraction Standards (JCPDS) - International Centre for Diffraction Data (ICDD) [07-0322]. For the main peak, the XRD estimated size is 22 nm based on the Scherrer equation.

TEM

Curved band of nanoparticles:



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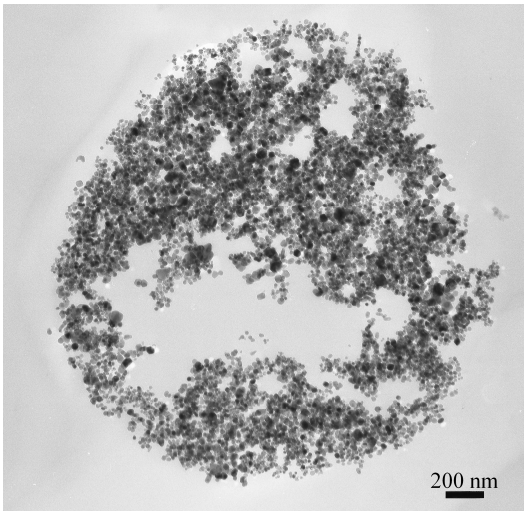
Aggregation of nanoparticles:



Unfortunately it was not possible to obtain an image of a full circle band of nanoparticles due to the extremely large size of these structures in the scale of TEM analysis. Even at lowest possible magnification the size of the polymer bead is much greater than the largest possible image size. Also, the Cu grid units used to support the polymer are smaller than polymer bead size. Furthermore, charging of the polymer and drift in the microscope makes it difficult to combine images over a larger size range.

ICP-AES

Elemental analysis was performed by means of inductively coupled plasma atomic emission spectroscopy of the remaining aqueous solution was performed using *Perkin-Elmer optima 3300 DV*. The level of iron detected in the remaining water is 0.076 mgL^{-1}. This corresponds to 0.105 mgL^{-1} of magnetite. The level in the original solution was ~ 900 mgL^{-1}. This indicates there is only ~0.012 % of the iron (and therefore nanoparticles) remaining in the solution after the polymer capture. This demonstrates a high nanoparticle capturing efficiency ideal for harvesting nanoparticles from aqueous solution.