Supplementary Info

S1: Preparation of the sample for plane dependent XRD:

For this purpose the nano plates ware dissolved in acetone to get a concentrated solution that was sonicated for 30 min after that a drop was put on the glass slide to evaporate the solvent. Then XRD was done.

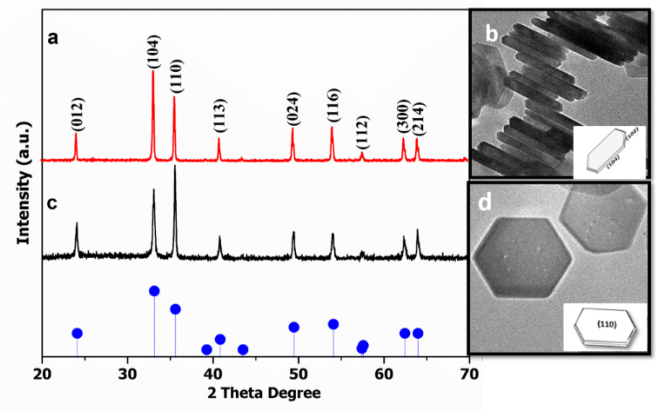

Fig. SI Anisotropic XRD patterns, TEM images and in the inset are geometric models (a, b) when of hexagonal nanoplates stands vertically (c, d) when plates lie horizontally. At the bottom are standard peaks of the -Fe_2O_3 structure (JCPDS 33-0664).

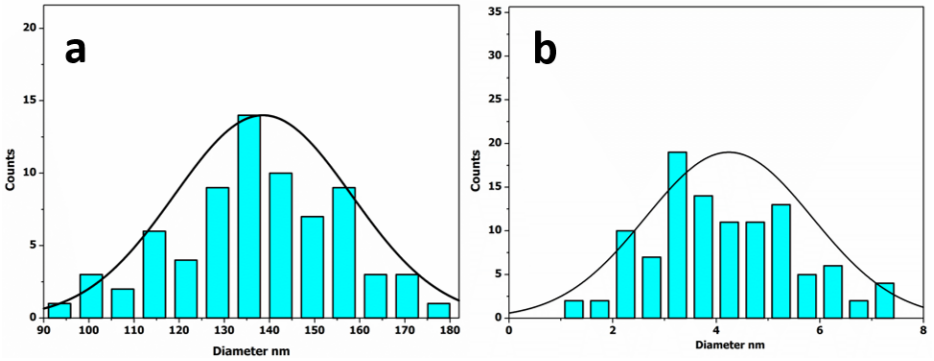

Fig. S2 Particles size distribution of hexagonal nanoplates (a) diameter of the nanoplates when it lies horizontally (b) thickness of the plates when in stands vertically

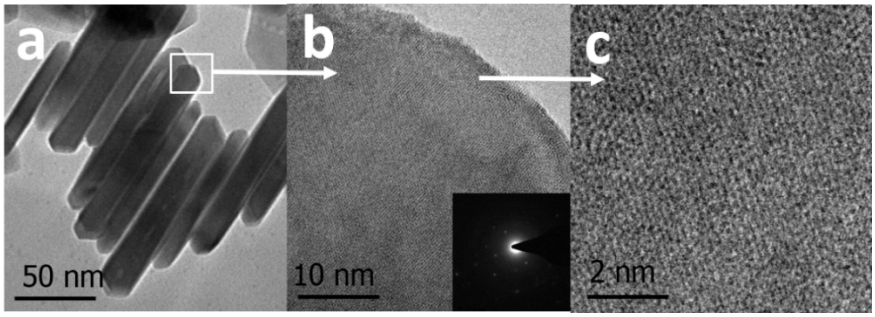

Fig. S3 (a) SEM image (b, c) HRTEM image of hexagonal nanoplates

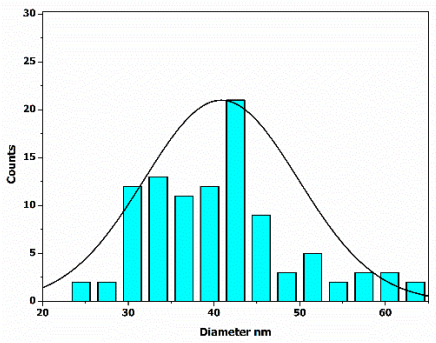

Fig. S4 Particles size distribution of cylindrical nanoplates

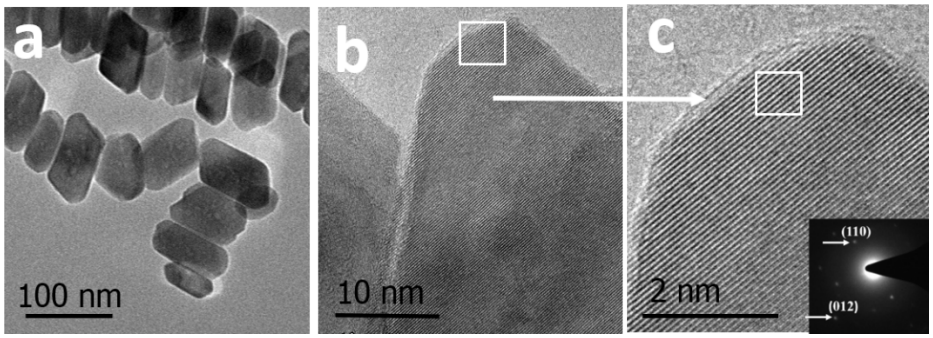

Fig. S5 (a) SEM image (b, c) HRTEM image of cylindrical nanoplates

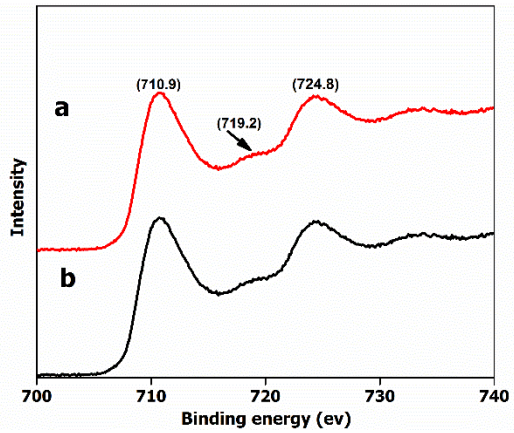

Fig. S6 XPS spectra of (a) hexagonal and (b) cylindrical nanoplates

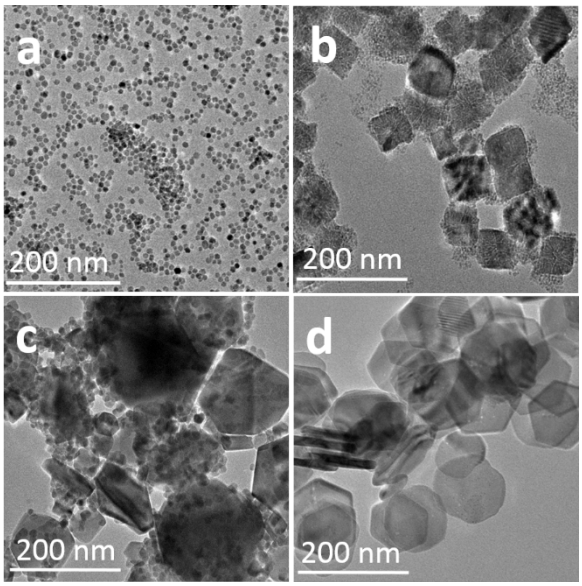

Fig. S7 TEM images of the hexagonal nanoplates synthesized at different solvothermal durations: (a) 2 h, (b) 4 h, (c) 8 h, and (d) 12h

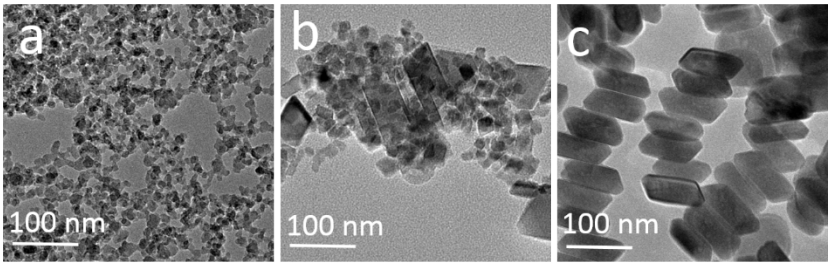

Fig. S8 TEM images of the cylindrical nanoplates synthesized at different solvothermal durations: at (d) 3h, (e) 6h, (f) 12h

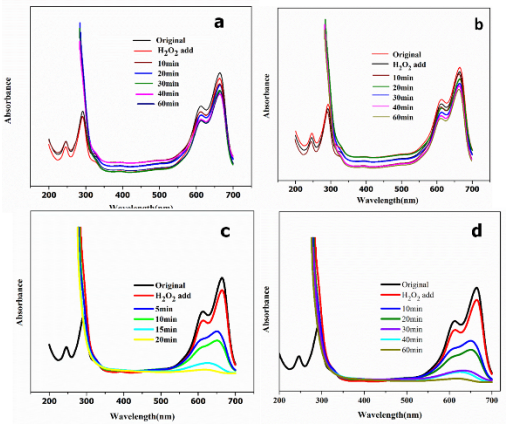

Fig. S9 Uv-vis spectral changes as function of time (a) MB without H_2O_2 (b) MB with H_2O_2 (c) Hexagonal nanoplates and H_2O_2 solution (d) cylindrical nanoplates and, H_2O_2 solution

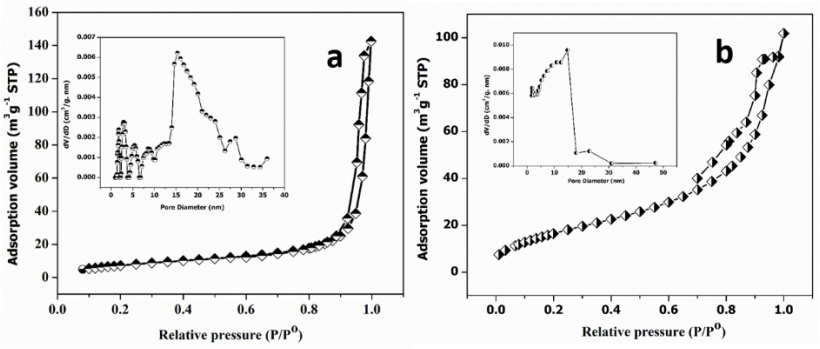

Fig. S10 N2 adsorption/desorption isotherm and the corresponding BJH pore size distribution of (a) Hexagonal nanoplates (b) cylindrical nanoplates

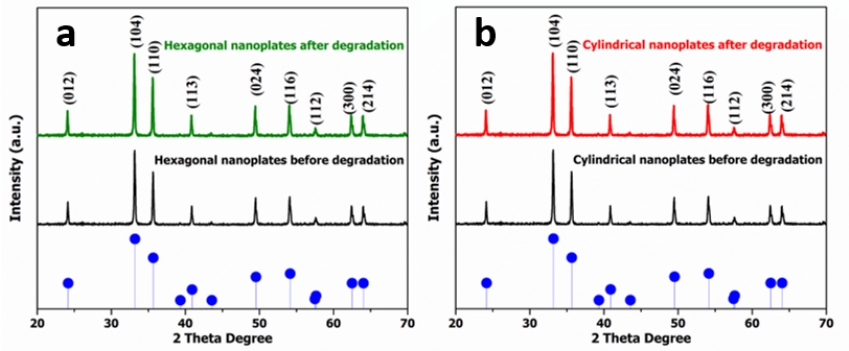

Fig. S11 XRTD peaks of the nanoplates before and after the MB degradation (a) Hexagonal nanoplates (b) cylindrical nanoplates