Supporting Information

A. TEM Data

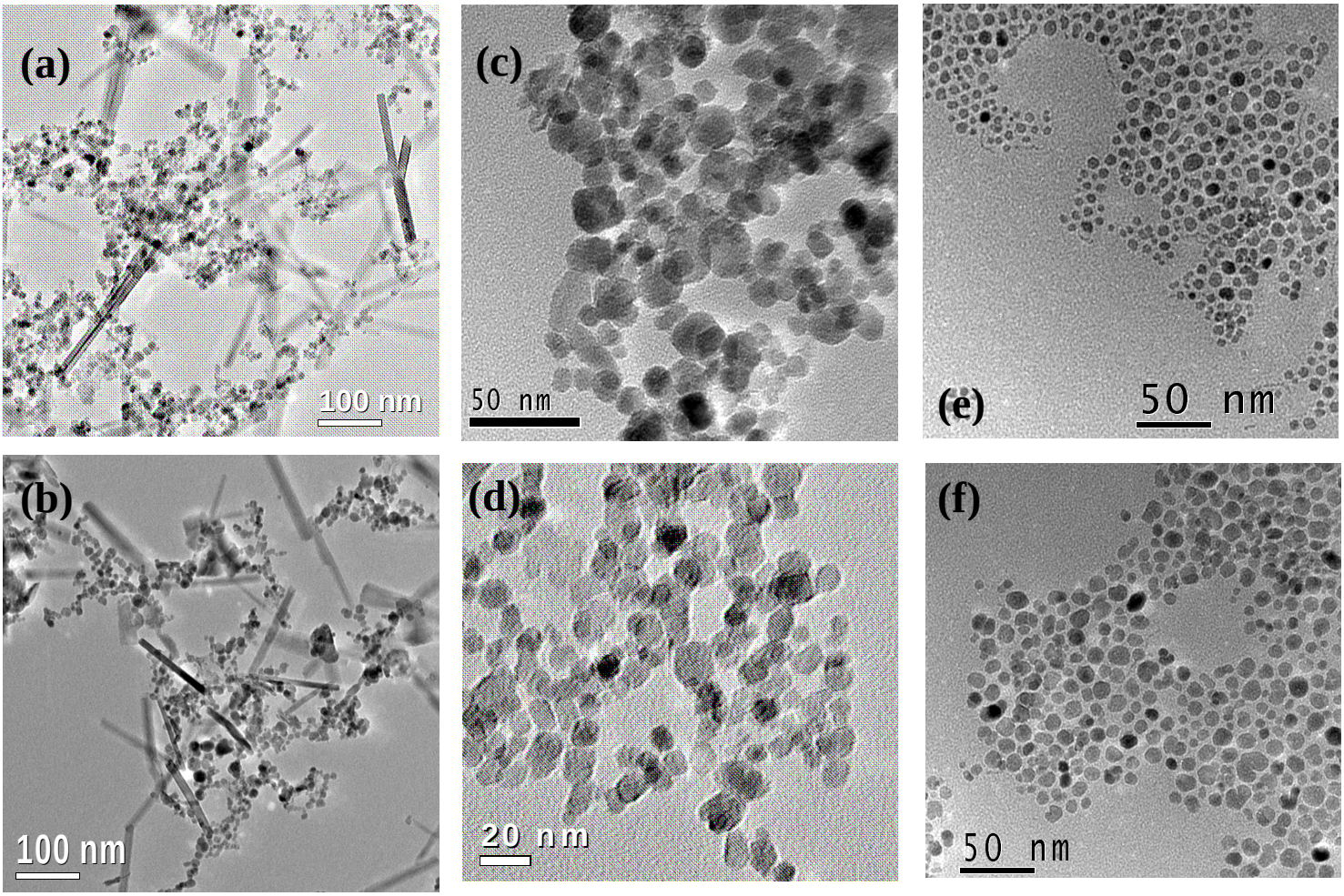

Figure S1: TEM images of the time-dependent growth of iron oxide nanoparticles in the aqueous system. (a) & (b) TEM images for iron oxide particle (Fe/amine mole ratio 1:1) growth after 3 h revealing highly non-uniform morphology. (c) and (d) The nanoparticles grow in size and becomes spherical after 12 h indicating. (e) and (f) TEM images after 3 h reaction time for Fe/amine mole ratio of 1:4.

B. XRD Patterns

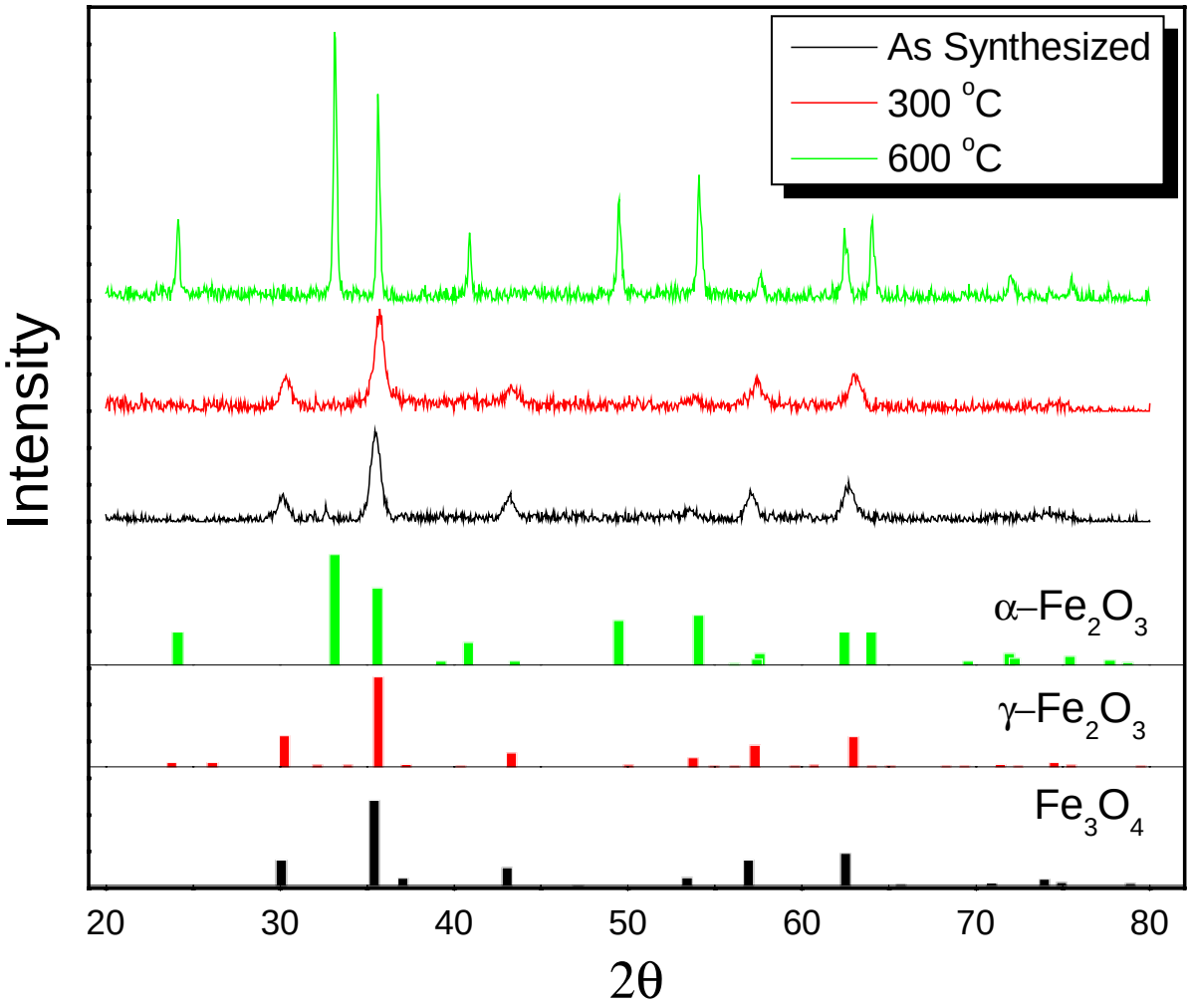

Figure S2. X-ray diffraction patterns of iron oxide nanoparticles produced with Fe/amine mole ratio 1:1. The superimposed patterns are as follows: a. for as synthesized powder, b. for a portion of powder calcined at 300 °C and c. after calcinations at 600 °C. The spectra are differentiated by black, red and green markers respectively. The bottom portion is marked with standard peaks of magnetite (black), maghemite (red) and hematite (green) matching well with the spectra of the as synthesized powder and annealed at two different temperatures. The scan was performed with 0.05 deg/step and collection time was 1 s for each point.

C. FTIR Spectroscopy

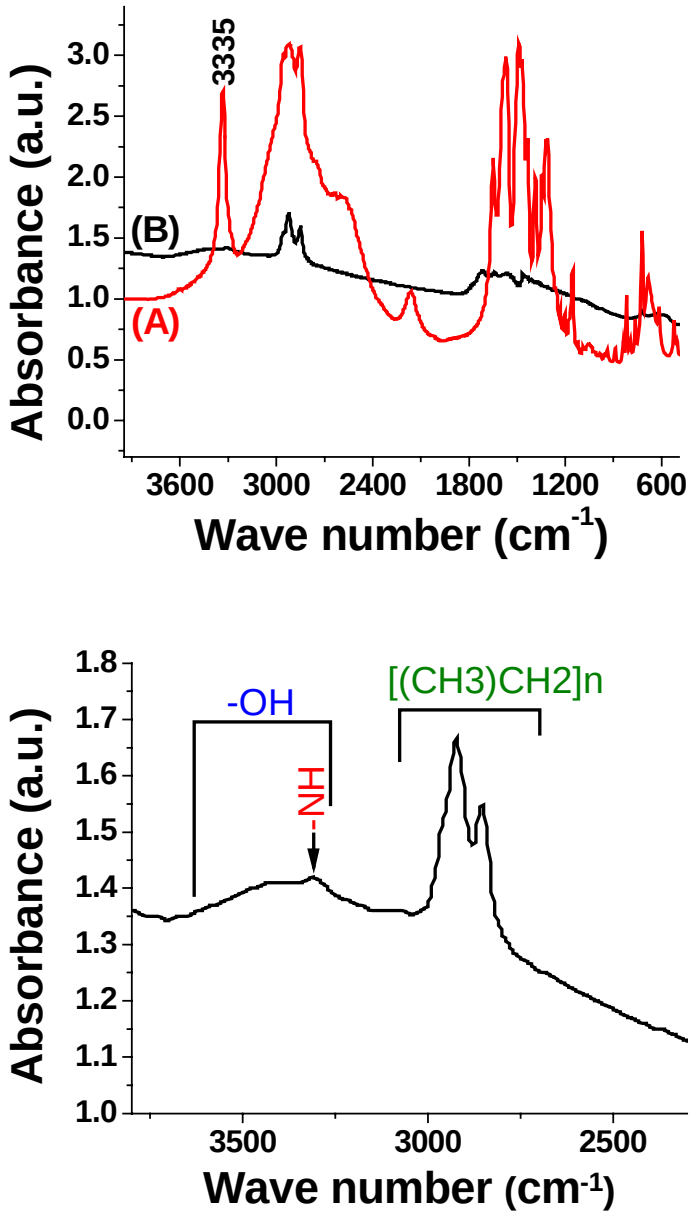

Figure S3: (Top) FTIR spectra (4000-400 cm^{-1}) of pure dodecylamine (curve A) and DDA-Fe_3O_4 nanoparticles (curve B) after mixing with KBr powder at room temperature. (Bottom) Magnified FTIR spectrum of Fe_3O_4 nanoparticles in the range of 2400-3600 cm^{-1}. The main resonances are identified in the figure and discussed in the text with reference to n-alkane and N-H vibrations on solid surfaces.

D. XPS Data

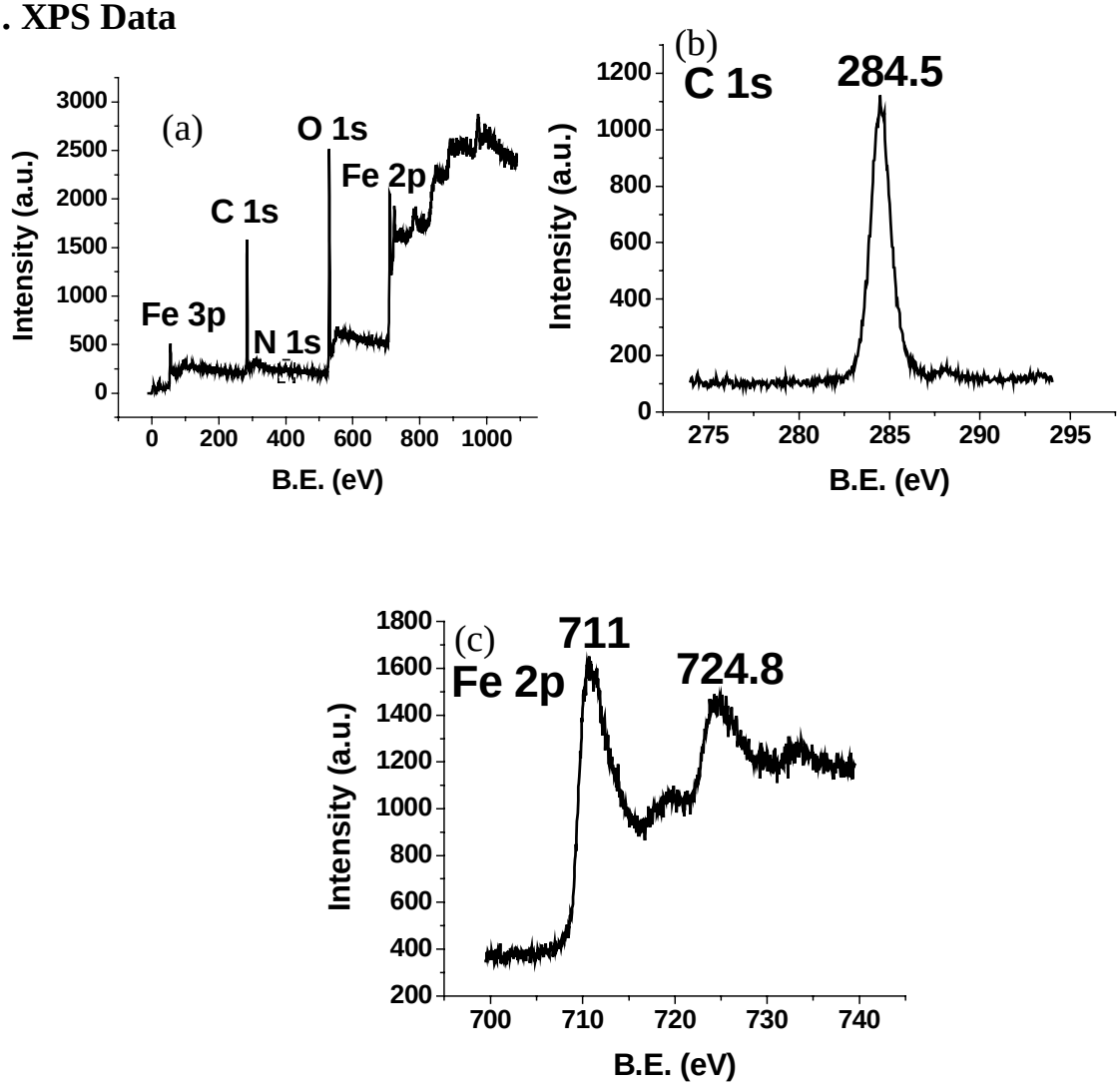

Figure S4 (a) Full raw scan of amine stabilized iron oxide nanoparticles and (b) C1s spectrum from amine-stabilized nanoparticles referenced at 284.5 eV. (b) Fe 2p core level spectra recorded from these nanoparticles film grown on a C tape by casting the iron oxide-amine nanoparticles powder. The spin-orbit components are shown in the figure. N 1s core level spectra recorded from these particles.