

## Supplementary information

### Synthesis and magnetostructural studies of amine functionalized superparamagnetic iron oxide nanoparticles

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## S1. Structural Analysis

The crystallographic structure and phase purity of  $\text{Fe}_3\text{O}_4$  NPs were investigated by powder XRD (miniflex 600) with Cu-K $\alpha$  radiation ( $\lambda=1.5404 \text{ \AA}$ ) in the  $2\theta$  range from  $05$  to  $90^\circ$ . The obtained pattern was evaluated by Panalytical X'pert high score software and compared with standard JCPDS (card no. 19-0629). Figure S1. shows the typical XRD pattern of the NPs which are synthesized at 5M concentration of DIPA with 2 hours reaction time. The present sample exhibited a typical spinel ferrite diffractogram, confirming the expected cubic spinel structure (Fd3m). The lattice constant is found to be  $\sim 8.39 \text{ \AA}$  which attributed to the formation of magnetite. It is also found that there is no evidence of any additional impurity peak.

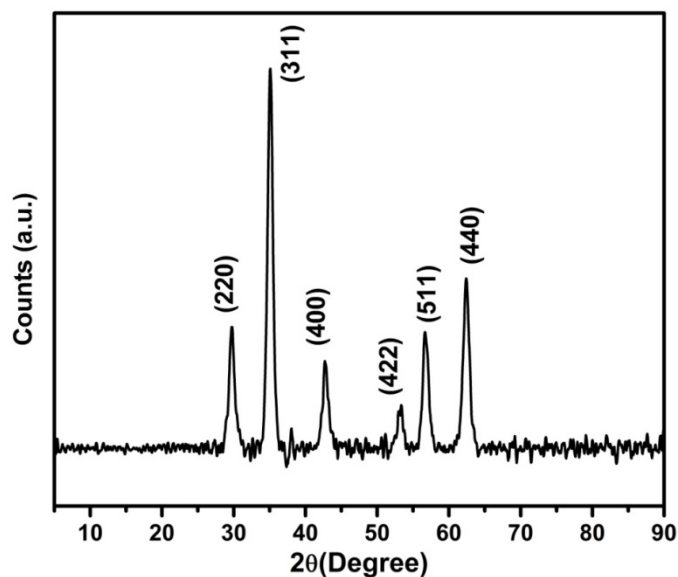
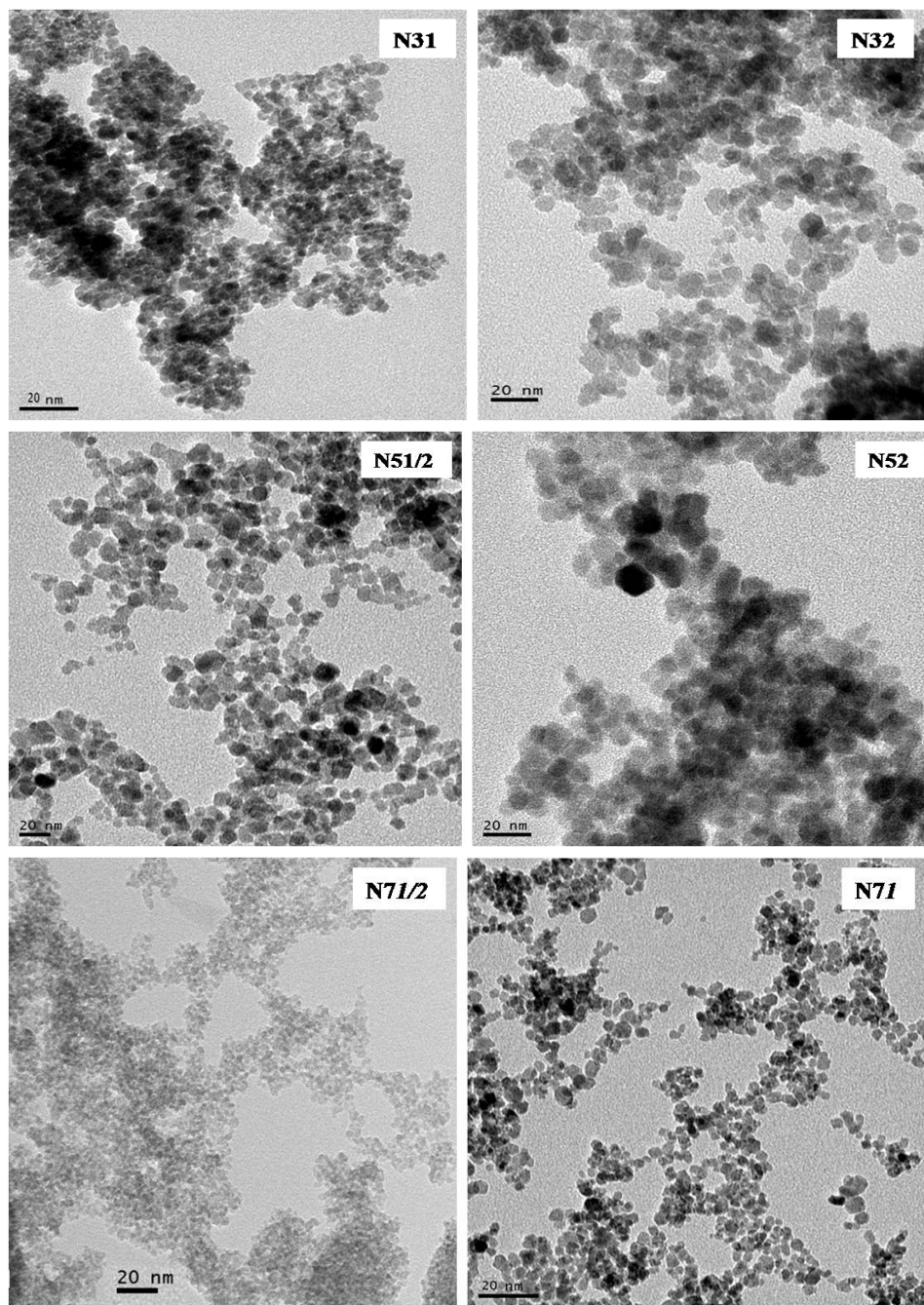


Fig. S1 XRD patterns of  $\text{Fe}_3\text{O}_4$  NPs at room temperature

## S2. TEM Analysis:

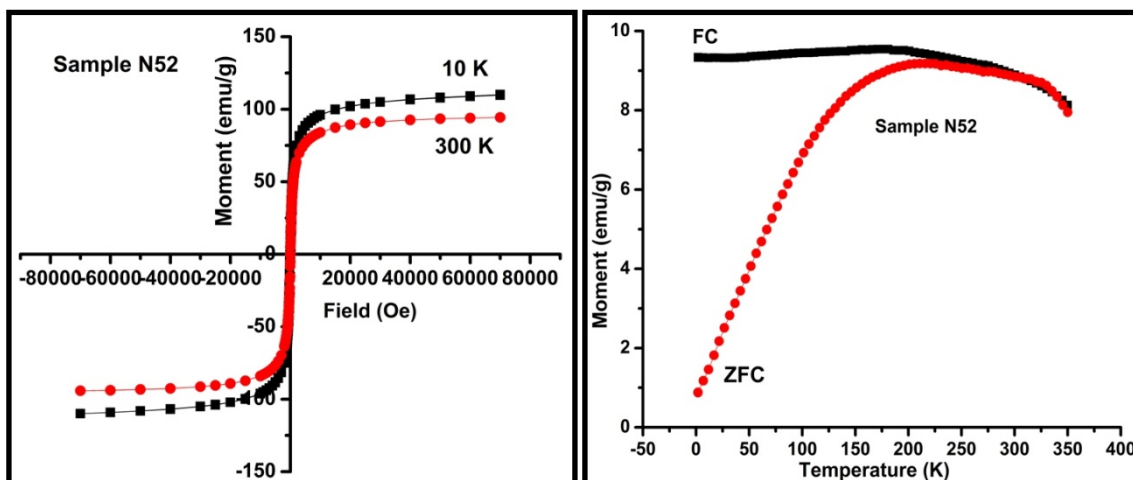
TEM pictures were collected for all  $\text{Fe}_3\text{O}_4$  NPs synthesized at different Concentrations and reaction time as described in the Experimental section to observe the shape and size of the NPs. The observed size of the Nanoparticles is given in the modified manuscript.



**Fig S2. TEM images of the samples synthesized by co precipitation method**

### S3. Magnetic Properties:

The Figure 7 shows the magnetic hysteresis of dried sample (N52) obtained by SQUID with an applied maximum magnetic field  $\pm 70$  kOe at 300K and 10K. From Fig.S3 (a) it is found that, the saturation magnetization of sample N52 is  $\sim 94$  emu/g at 300K and  $\sim 110$  emu/g at 10K. An FC-ZFC measurements for the same sample was measured in a static field of 100 Oe.



(a)

(b)

**Fig. S3 (a)** Magnetization vs applied magnetic field at room temperature with H up to 70 kOe  $\text{Fe}_3\text{O}_4$  NPs, (b) Temperature dependence of the magnetization (ZFC and FC) over the temperature range 5–350 K with H = 100 Oe.

