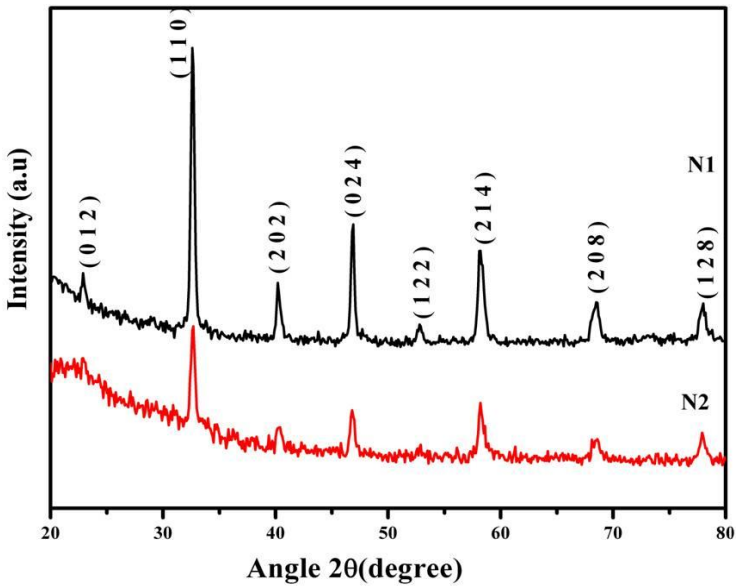

Figure S1. XRD pattern of LSMO (N1) synthesized by combustion technique and annealed at 800 °C for 5h and OA-betaine HCl functionalized LSMO MNPs (N2).

3.1 Crystallographic study

Figure 1 shows the X-ray diffraction patterns of the LSMO samples. All the reflection peaks are indexed with JCPDS card (reference code: 00-051-0409) and pseudo-cubic perovskite structure is observed (spacegroup R-3c). The Gaussian fit of the most intense peak (110) was used to calculate the full width at half maximum for determination of crystallite size (D) by equation $D = 0.9\lambda / \beta\cos\theta$, where λ is wavelength of incident X-ray (1.5405Å), θ the corresponding Bragg's diffraction angle and β full width at half maximum of the (110) peak. The average crystallite size obtained by above equation is 25 nm for bare MNPs suggest the formation of crystallites in nanosize. However, the peaks become broad and intensity decreases after functionalization of LSMO with OA-betaine HCl Figure 2 (N2). Decrease in signal to noise ratio is due to effect of coating which affects the surface of MNPs and internal strain is induced to MNPs which decreases the intensity of the peaks after coating. The crystallite size was not influenced by the coating.

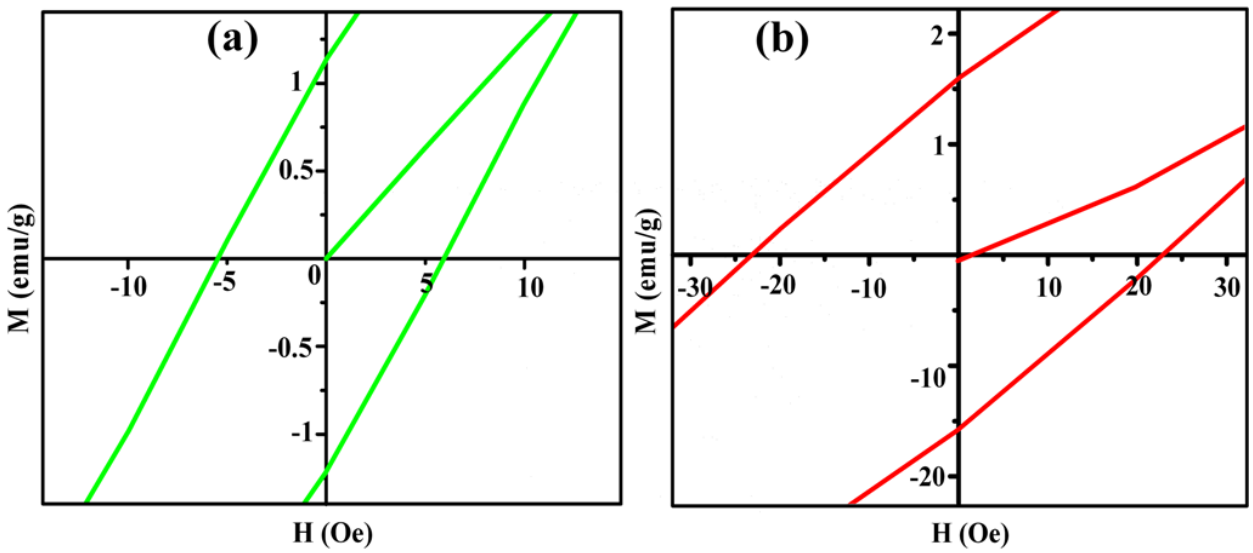

Figure S2. A close-up of the hysteresis loops of OA-betaine HCl functionalized LSMO MNPs at (a) 300 (b) 5 K.

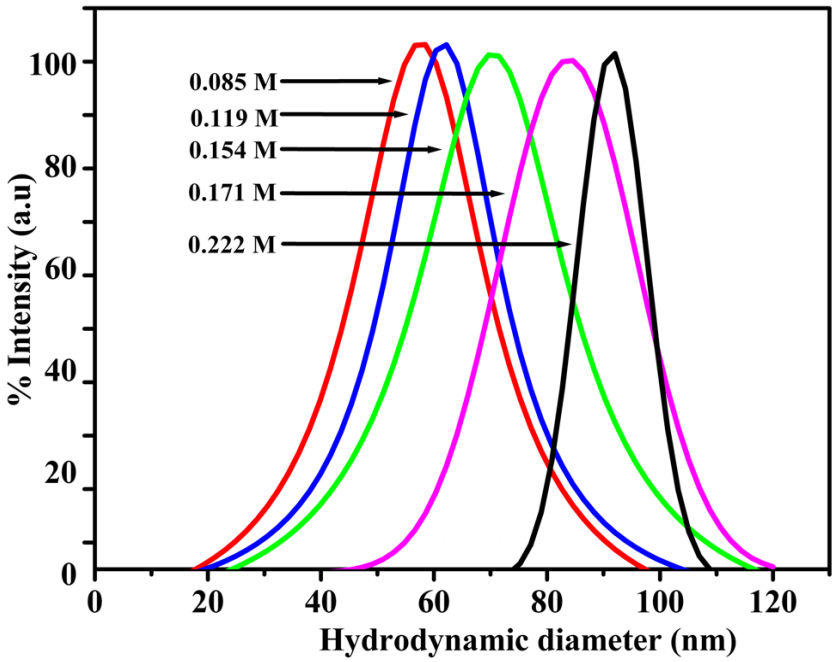

Figure S3. NaCl dependent particle size distribution of functionalized LSMO MNPs

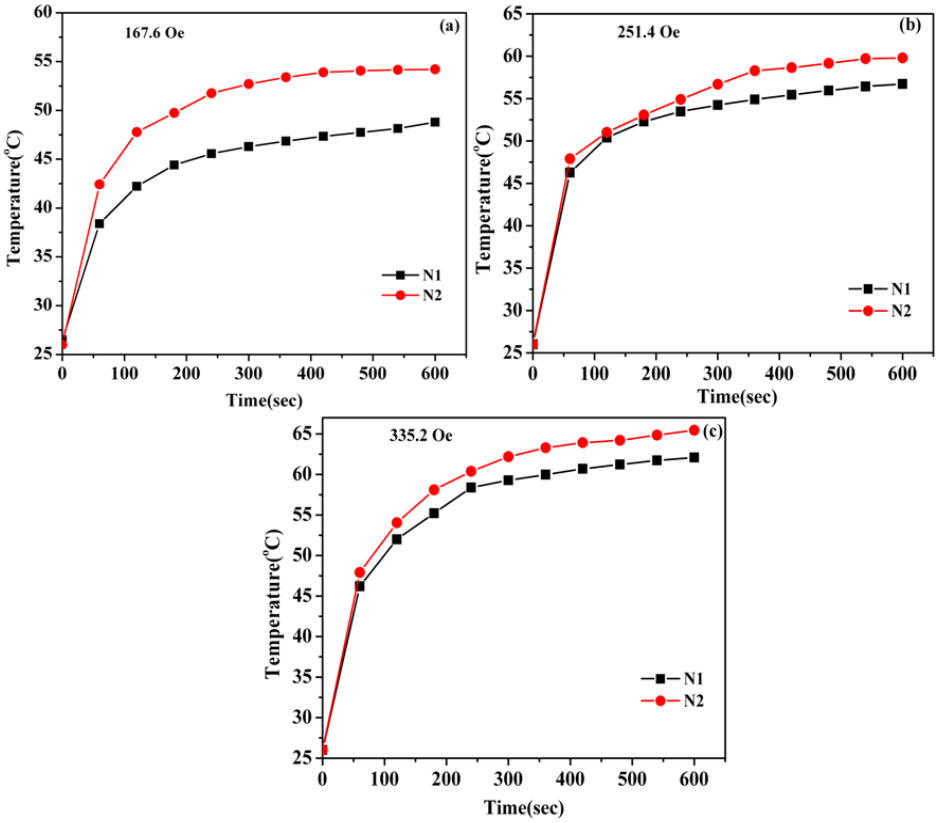

Figure S4. (a-c) Temperature kinetic curves obtained after application of an AC magnetic field on both samples dispersed in water with concentration of 10 mg/mL