Electronic Supplementary Information (ESI)

1. Magnetic hysteresis curves of the $MnFe_2O_4$ NPs with different reaction temperature

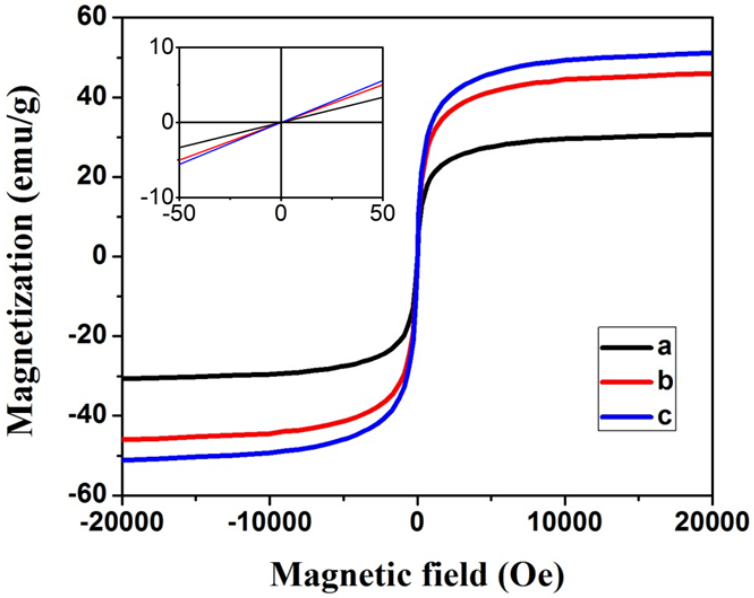

Figure S1 Magnetic hysteresis curves of the $MnFe_2O_4$ NPs at 300 K with different reaction temperature (a) 140 °C (b) 160 °C (c) 180 °C

Figure S1. shows the magnetization hysteresis curves of the synthesized $MnFe_2O_4$ NPs at 300 K and with the magnetic field of 20 kOe. We can draw from Figure S1 that $MnFe_2O_4$ NPs prepared at 140 °C, 160 °C and 180 °C have superparamagnetic properties for their remanence and coercivity are zero. And their saturation magnetization is 30.67, 46.01 and 51.12 $emu \cdot g^{-1}$, respectively. With the increasing of reaction temperature, NPs become larger, which makes the saturation magnetization increasing simultaneously.

2. X-ray diffraction of MFe_2O_4 NPs

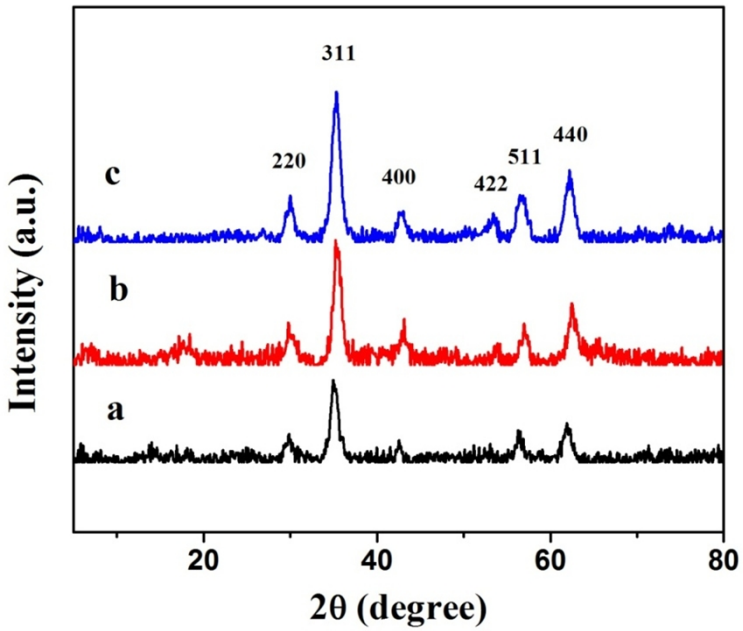

Figure S2 X-ray diffraction of (a) $CoFe_2O_4$ NPs (b) $NiFe_2O_4$ NPs (c) $ZnFe_2O_4$ NPs

XRD experiments were performed to identify the crystallo-graphic structure and estimated the particle size (Figure S2). All the nanomaterials exhibited a typical ferrite diffractogram pattern, confirming the expected cubic spinel structure (Fd3m). As shown in Figure S2, The discernible peaks can be indexed to the diffraction peaks of the as-synthesized Fe_3O_4 NPs at 18.1, 30.0, 35.5, 37.0, 43.0, 53.0, 57.0 and 62.6, which are respectively ascribed to the (111), (220), (311), (222), (400), (422), (511) and (440) planes of $CoFe_2O_4$ (JCPDS No.22-1086), $NiFe_2O_4$ (JCPDS No. 87-2338) and $ZnFe_2O_4$ (JCPDS No. 89-1010), which indicates the obtained NPs are magnetite. The average particle size of the NPs is calculated to be about 6.6 nm for $CoFe_2O_4$, 7.8 nm for $NiFe_2O_4$, and 7.6 nm for $ZnFe_2O_4$ by using Scherer's equation from the half-maximum width of the (311) X-ray diffraction line.

3. DLS plots of bare $MnFe_2O_4$ NPs

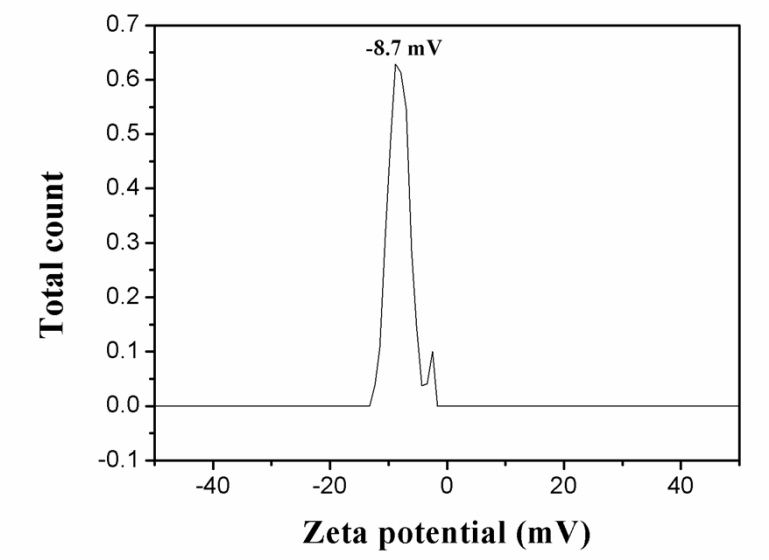

Figure 3. DLS plots of bare $MnFe_2O_4$ NPs

4. Magnetic hysteresis curves of surfactant coated $MnFe_2O_4$ NPs at 300 K

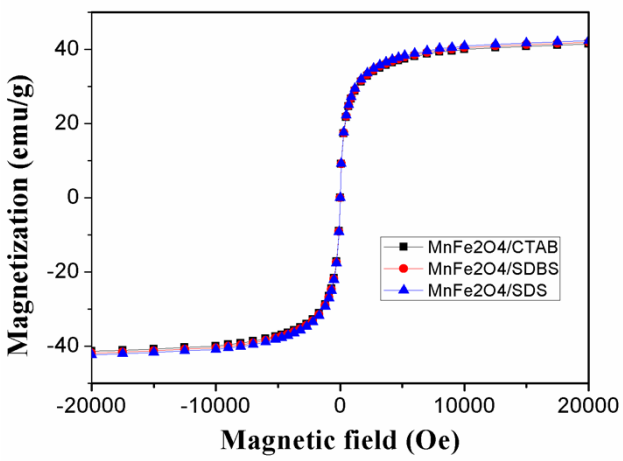

Figure 4. Magnetic hysteresis curves of CTAB, SDBS and SDS functionalized $MnFe_2O_4$ NPs.

The magnetic properties of functionalized superparamagentic particles will also present superparamagentic properties. The magnetic saturation of functionalized magentic particles is smaller than that of the bare mangnetic particles. Their saturation magnetization is 41.41 ($MnFe_2O_4$/CTAB), 41.87 ($MnFe_2O_4$/SDBS) and 42.22 ($MnFe_2O_4$/ SDS) emu·g^{-1}, respectively.