Supporting Information

The spatial distributions of the atomic constituents of the nanocomposite film were investigated using a Technai F-20 TEM equipped with an energy dispersive X-ray (EDX) spectrometer. A low-magnification planar view STEM image of the film is given in Figure S1.a, which shows that the diameter of Fe_3O_4 nanocolumns is approximately several tens nanometers. An EDX line scan along the blue line in Figure S1.a was conducted to demonstrate the Fe distribution in the film plane. As shown in the inset, the nanocolumn is Fe-rich, whereas the Fe concentration in the In_2O_3 matrix is almost zero. The thickness of the nanocmposite film was determined by a low-magnification cross-sectional TEM micrograph (Figure S1.b), which indicates the thickness is approximately 150nm. The Fe_3O_4 nanocolumns can also be observed as indicated by arrows in the micrograph.

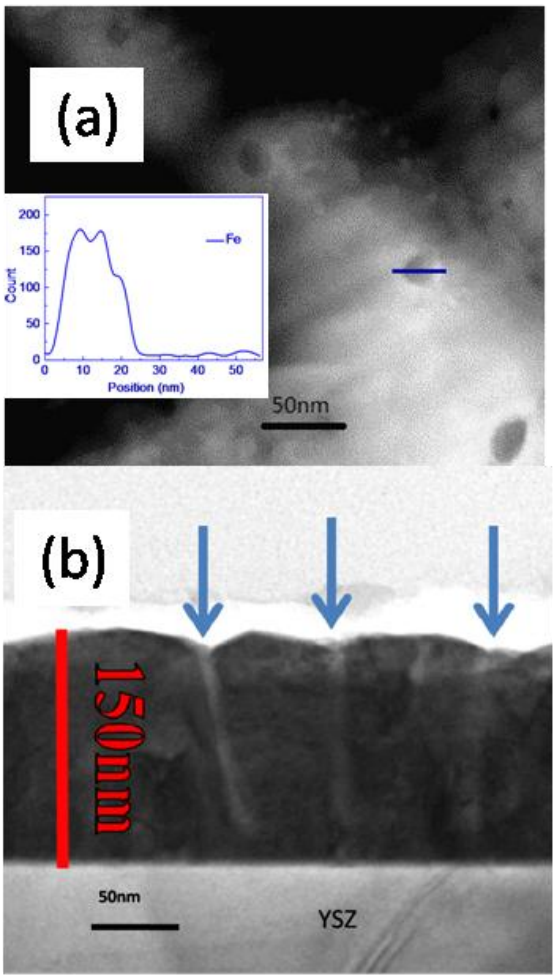

Figure S1 (a) Low-magnitude plane view STEM image using a HADDF detector, the dark spots are Fe_3O_4 nanocolumns and inset shows Fe chemical distribution measured by EDX along the blue line as indicated in the micrograph. (b) low-magnification cross-sectional TEM micrograph of the nanocomposite film.

The temperature dependences of the magnetization and resistivity for the nanocomposite film are shown in Figure S2. No clear Verwey transition is observed in the M-T curve probably due to the wide dispersal of the size of Fe_3O_4 nanocolumns or the clamping effect due to the In_2O_3 matrix. However, the microcosmic mechanism still needs further study. As shown in Figure S2.b the electrical resistivity decreases with lowering temperature from 300K to 120K and then gently increases with a further decrease in temperature down to 5 K. This temperature dependence of resistivity may be related to the temperature dependence of the MR value. No Verwey transition is observed in the ρ-T curve because the resistivity of the In_2O_3 matrix is much lower than that of Fe_3O_4 nanocolumns

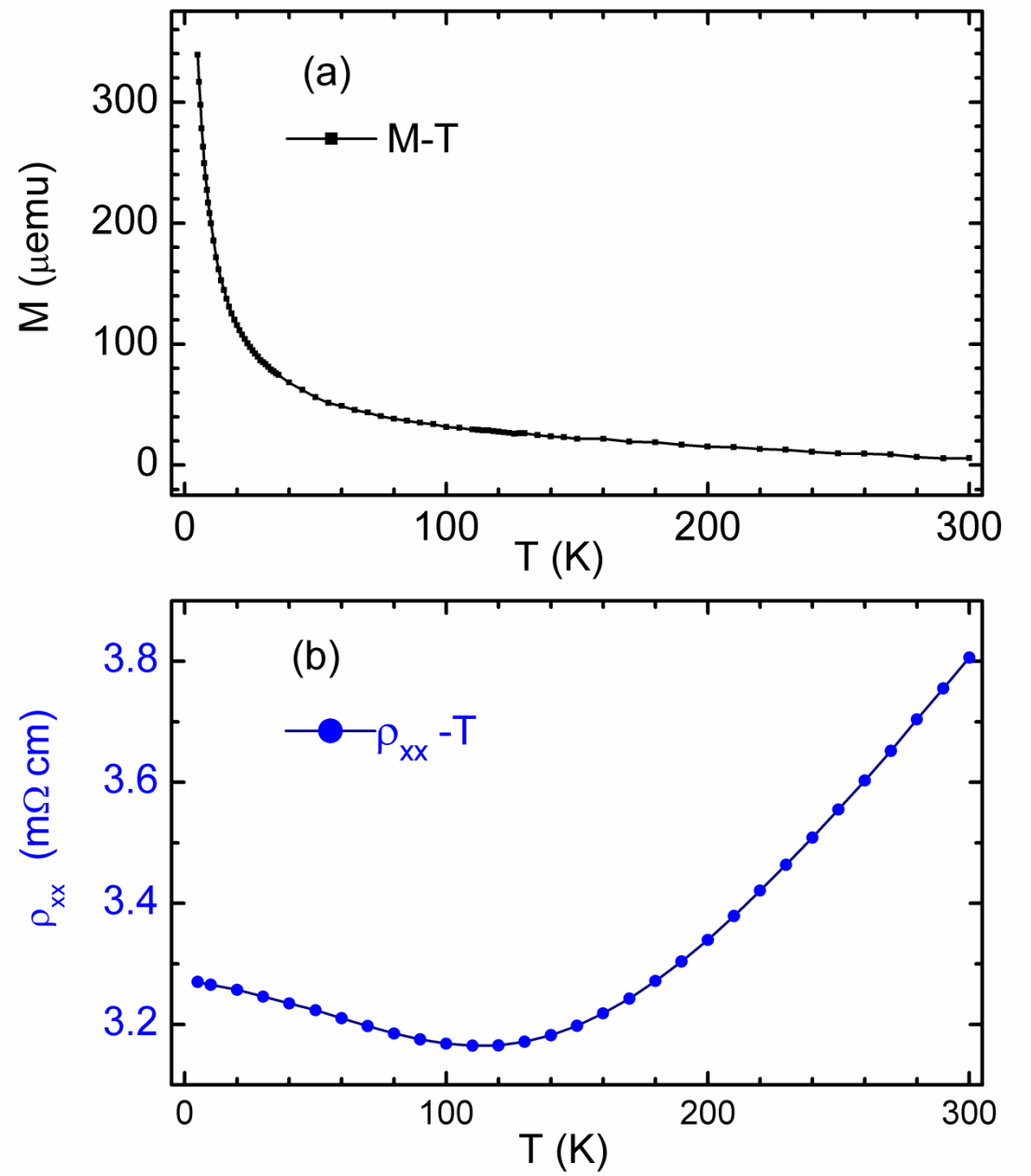

Fig.2 (a) Temperature dependence of the saturation magnetization of the nanocomposite film measured at 2 T. **(**b) Temperature dependence of the resistivity of the nanocomposite film.