Electronic Supplementary Information

Effect of Oleic Acid Ligand on Photophysical, Photoconductive and Magnetic Properties of Monodisperse SnO_2 Quantum Dots

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Experimental description and verification of ligand exchange via FTIR

The ligand exchange process (mass-action driven ligand exchange) was used to replace the long chain ligand OA by short chain n-Butylamine under inert atmosphere to prevent from oxidation. OA capped QDs were dispersed in n-Butylamine at a concentration of 100 mg/ml. The solution was left for 3 days under inert conditions. Then it was redispersed and precipitated with degassed isopropanol and then dried and redispersed in

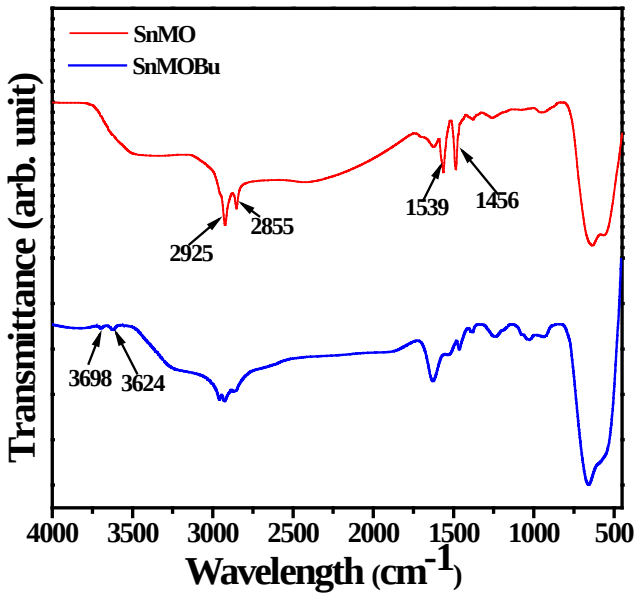

Figure S1: FTIR spectra of the OA (SnMO) and n-Butylamine (SnMOBu) capped SnO_2.

anhydrous chloroform under inert conditions.

Figure S1 shows the FTIR spectra of the OA and n-Butylamine capped QDs. N-H stretching and bending vibrations were observed between 3200-3700 cm^{-1} and 1450-1650 cm^{-1}, respectively. The IR spectra of the OA capped sample SnMO gives the asymmetric and symmetric stretching modes of CH_2 group of long chain oleate at 2925 cm^{-1} and 2855 cm^{-1}. The absence of a carbonyl stretching vibration in the n-Butylamine capped QDs indicates that OA ligands attached to SnO_2 QDs have been replaced by n-Butylamine.

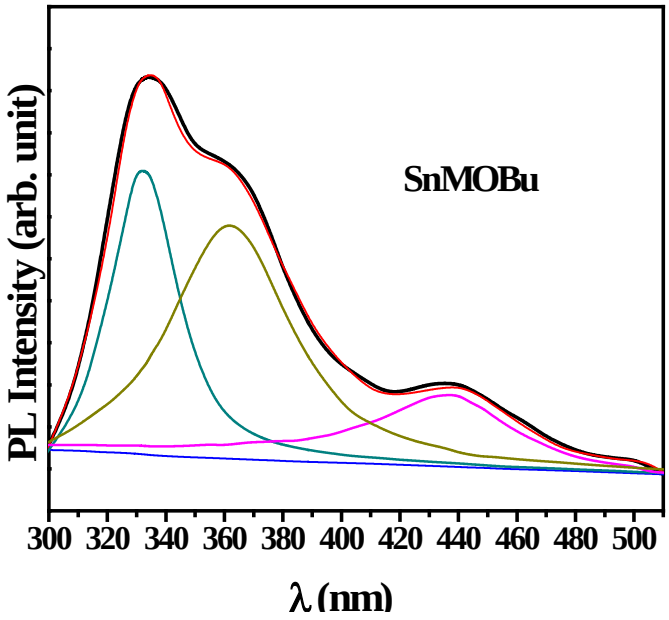

Figure S2: PL spectrum of the n-Butylamine (SnMOBu) capped SnO_2.

Figure S2 shows the PL spectrum of the n-Butylamine capped SnO_2 (SnMOBu). The integrated intensity of 361 nm peak is maximum (I_{max}), which is normalized to unity. The relative integrated intensities of other two peaks are 0.7 (332 nm) and 0.2 (432 nm). Therefore the blue light is quenched compared with the OA capped sample SnMO.

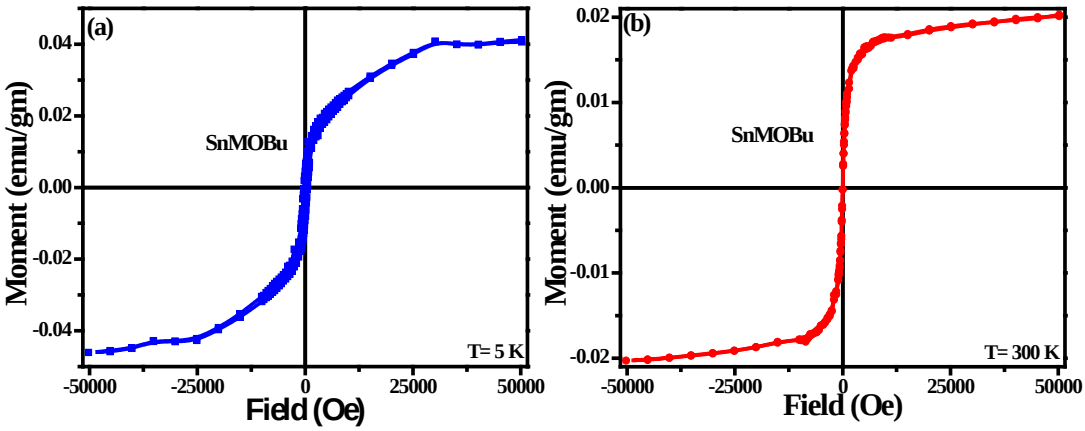

Figure S3 (a and b): Magnetization vs. Magnetic field (M-H) curves for the sample SnMOBu at the temperatures 5 K and 300 K respectively.

Magnetization as a function of applied magnetic field correcting diamagnetic contribution at 300 K and 5 K of the ligand exchanged sample SnMOBu is shown in Fig. S3. The magnetization clearly indicates the ferromagnetic behavior similar to other samples. The saturation magnetization is larger than SnUMO but smaller than SnMO.