Electronic Supplementary Material (ESI) for RSC Advances
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Supporting Information

Effects of rare earth elements doping on ethanol gas-sensing performance of three-dimensionally ordered macroporous In_2O_3

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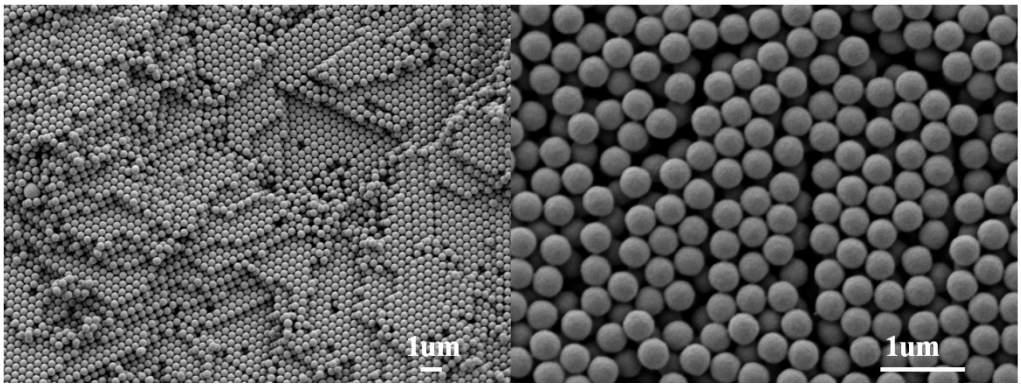

Fig. S1. SEM images of PMMA microspheres

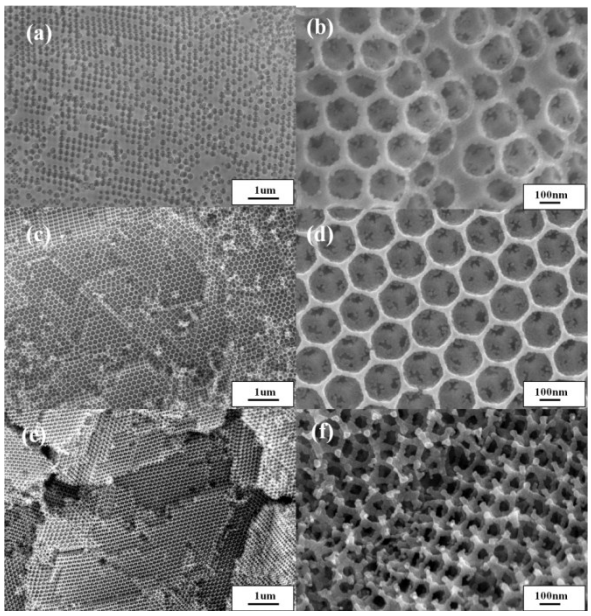

Fig. S2. SEM images of 3DOM In_2O_3 annealed at 550 °C (a, b), 600 °C(c, d), 650 °C (e, f)

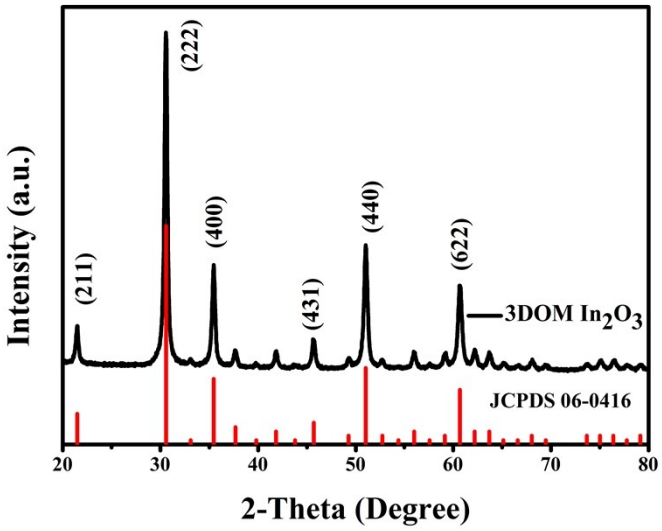

Fig. S3. XRD images of 3DOM In_2O_3

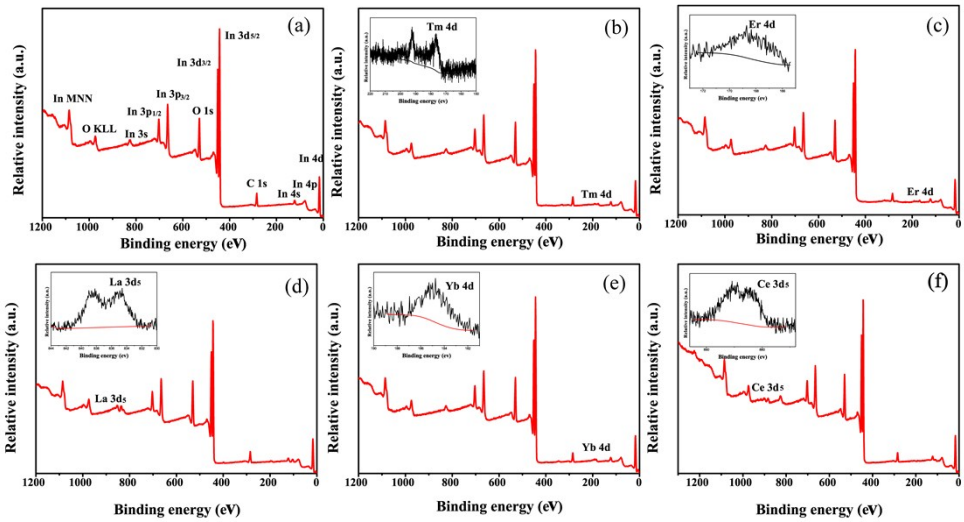

Fig. S4. XPS patterns of the samples 3DOM In_2O_3 (a); 3DOM In_2O_3-Tm (b); 3DOM In_2O_3-Er (c); 3DOM In_2O_3-La (d); 3DOM In_2O_3-Yb (e); 3DOM In_2O_3-Ce (f)

The gas sensing properties to 100 ppm ethanol for 3DOM In_2O_3 with 2%, 5%, 8% doping ratio at various working temperature are shown in Fig. S5. Tm is an effective dopant to increase In_2O_3 sensing response and decrease the operating temperature. In particular, the gas sensing sensitivity value increases with the increasing of Tm concentration from 2 % to 5 %, but decreases when the Tm concentration at 8 %. Additionally, the optimum operating temperatures are at 230°C for pure In_2O_3, 200°C for 3DOM In_2O_3-2% Tm, and 175°C for 5% and 8% Tm-doped. The experiment results show that the optimum performance can be achieved with 5% doping ratio of Tm.

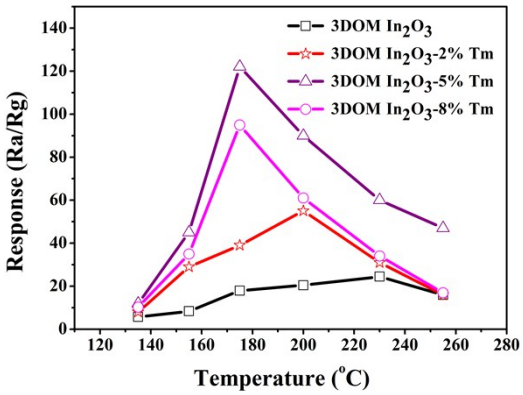

Fig. S5 Gas response of pure and 3DOM In_2O_3-Tm to 100 ppm ethanol at different operating temperatures

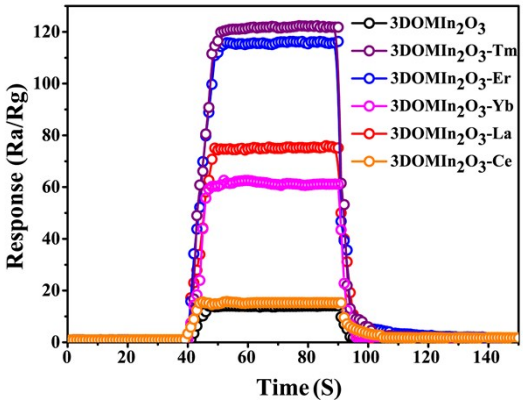

Fig. S6. Response curve of pure and RE doped 3DOM In_2O_3 to 100 ppm ethanol under the optimum working temperature of 175°C

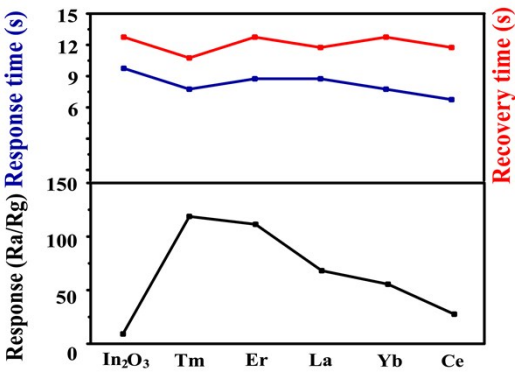

Fig. S7. Response and response/recovery time of pure and RE doped 3DOM In_2O_3 to 100 ppm ethanol

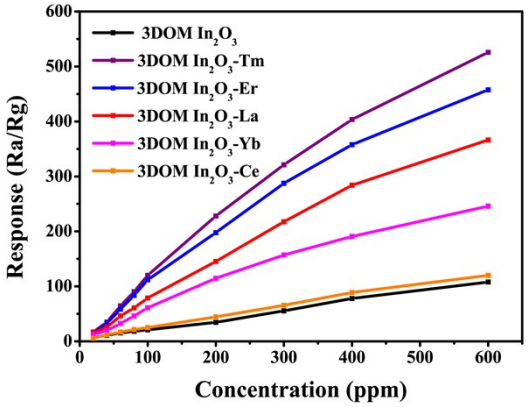

Fig. S8. Gas response of pure and RE doped 3DOM In_2O_3 to different concentration of ethanol at the optimum operating temperature