

## **Supplementary Information**

### **Sonochemical engineering of highly efficient and robust Au nanoparticles wrapped on Fe/ZrO<sub>2</sub> nanorods and their controllable products selectivity in dimethyl oxalate hydrogenation**

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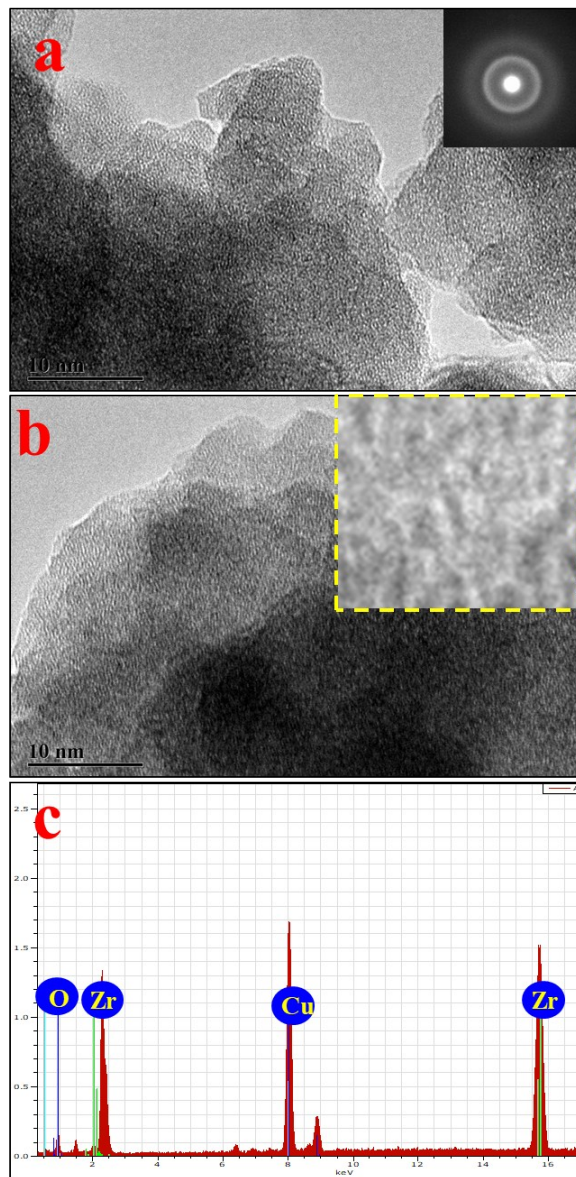
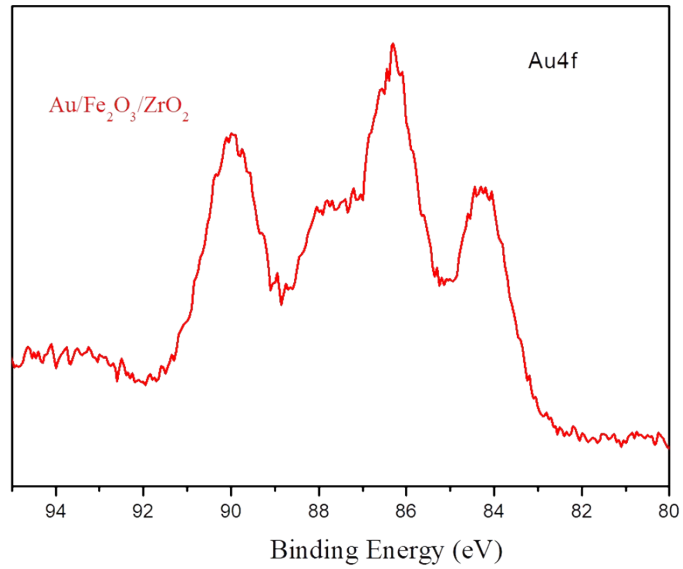
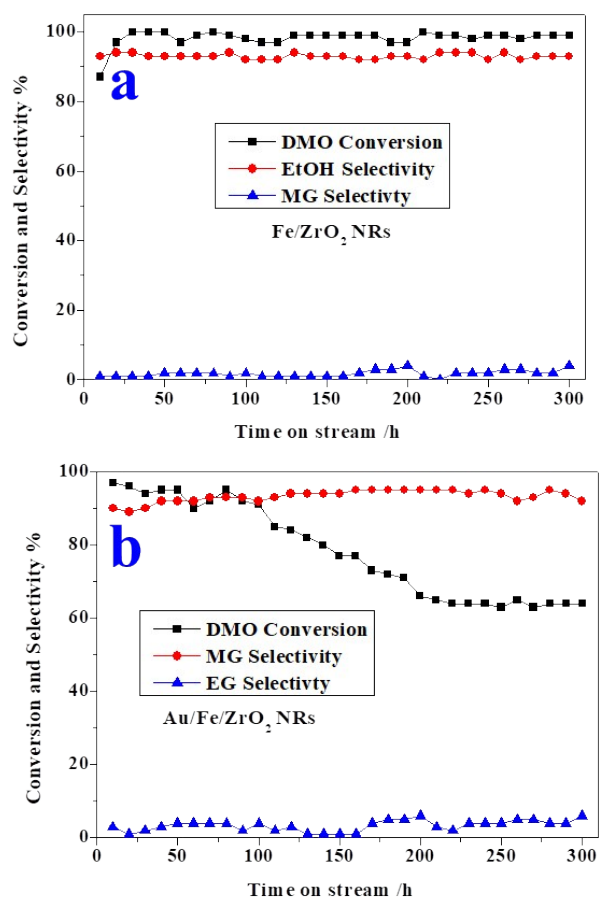


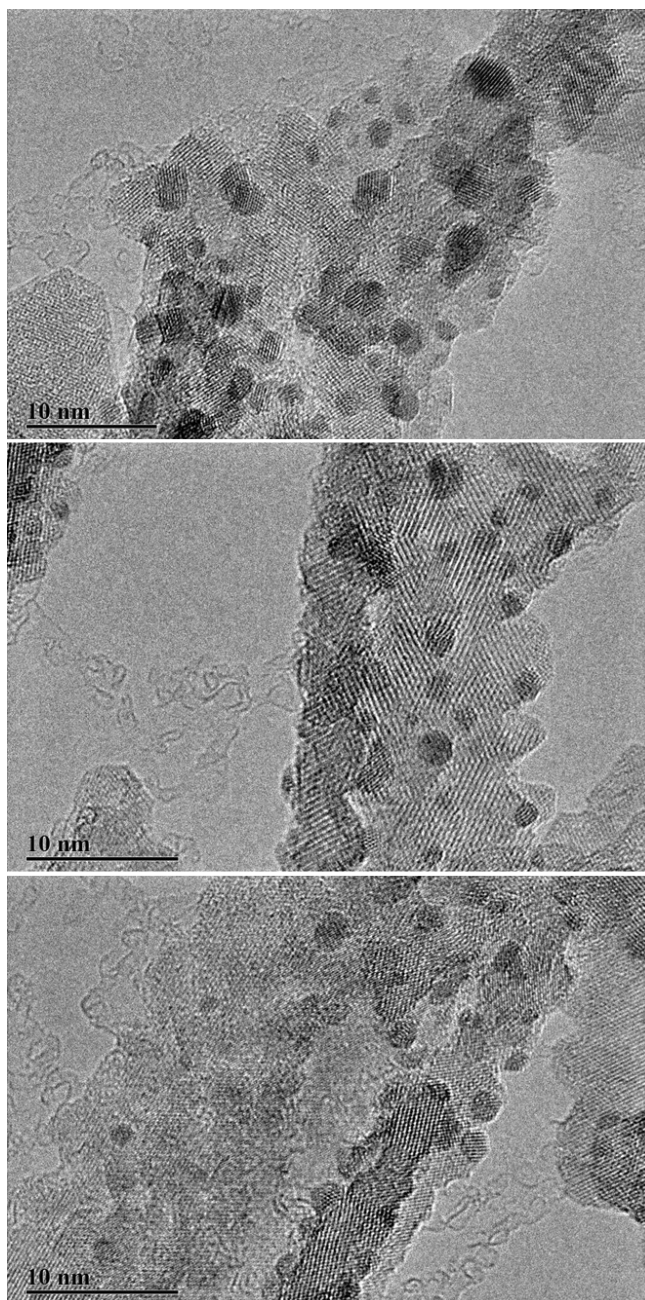
Fig. S1 TEM and HRTEM images of amorphous ZrO<sub>2</sub> (a, b) and EDS elemental analysis (C).



**Fig. S2** High resolution XPS spectrum for the Au 4f of Au coated Fe/ZrO<sub>2</sub> nanorods



**Fig S3** MG, EtOH and DMO conversion ratio for (a) Fe/ZrO<sub>2</sub> catalyst and (b) Au/Fe/ZrO<sub>2</sub> NRs after 300 h



**Fig. S4** Various TEM images for the spent Au decorated Fe/ZrO<sub>2</sub> catalyst