

A General Approach for the Synthesis of Bimetallic M-Sn (M=Ru, Rh and Ir) Catalysts for Efficient Hydrogenolysis of Ester

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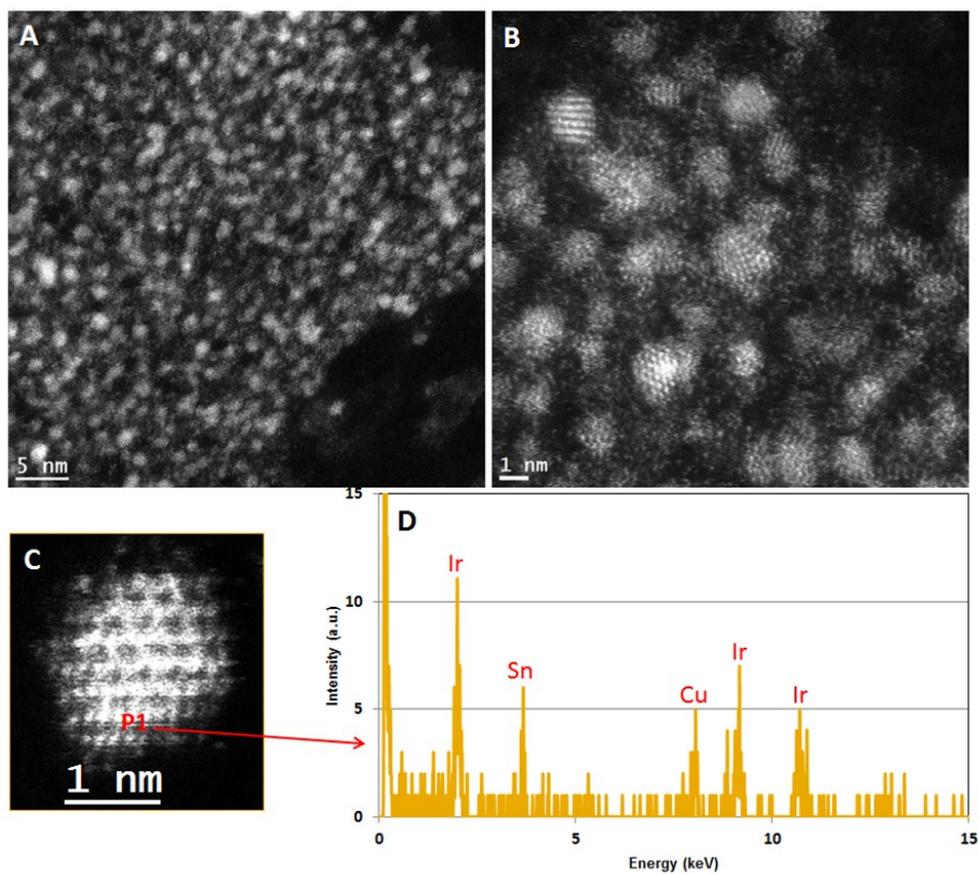


Fig. S1 STEM images of Ir-Sn nanoparticles with different magnification (A, B and C) and EDS point analysis on a randomly selected Ir-Sn bimetallic nanoparticle. Presence of Cu is obtained from carbon coated copper grid.

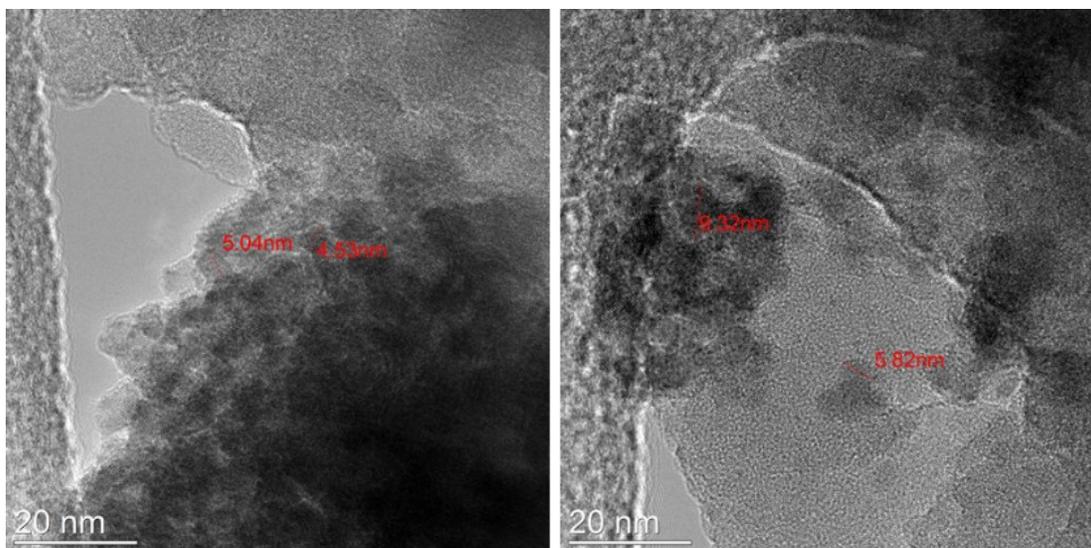


Fig. S2 TEM images of Ir-Sn/SiO₂ catalyst synthesized by impregnation method.

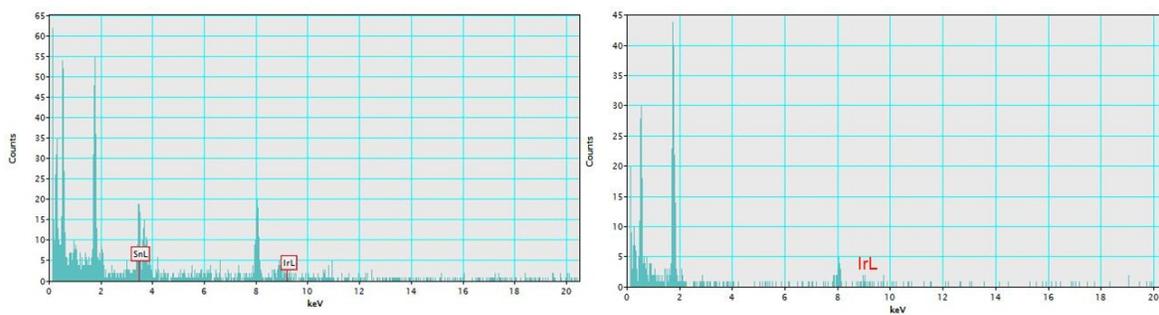


Fig. S3 EDS analyses on two randomly selected particles from Fig. S2.

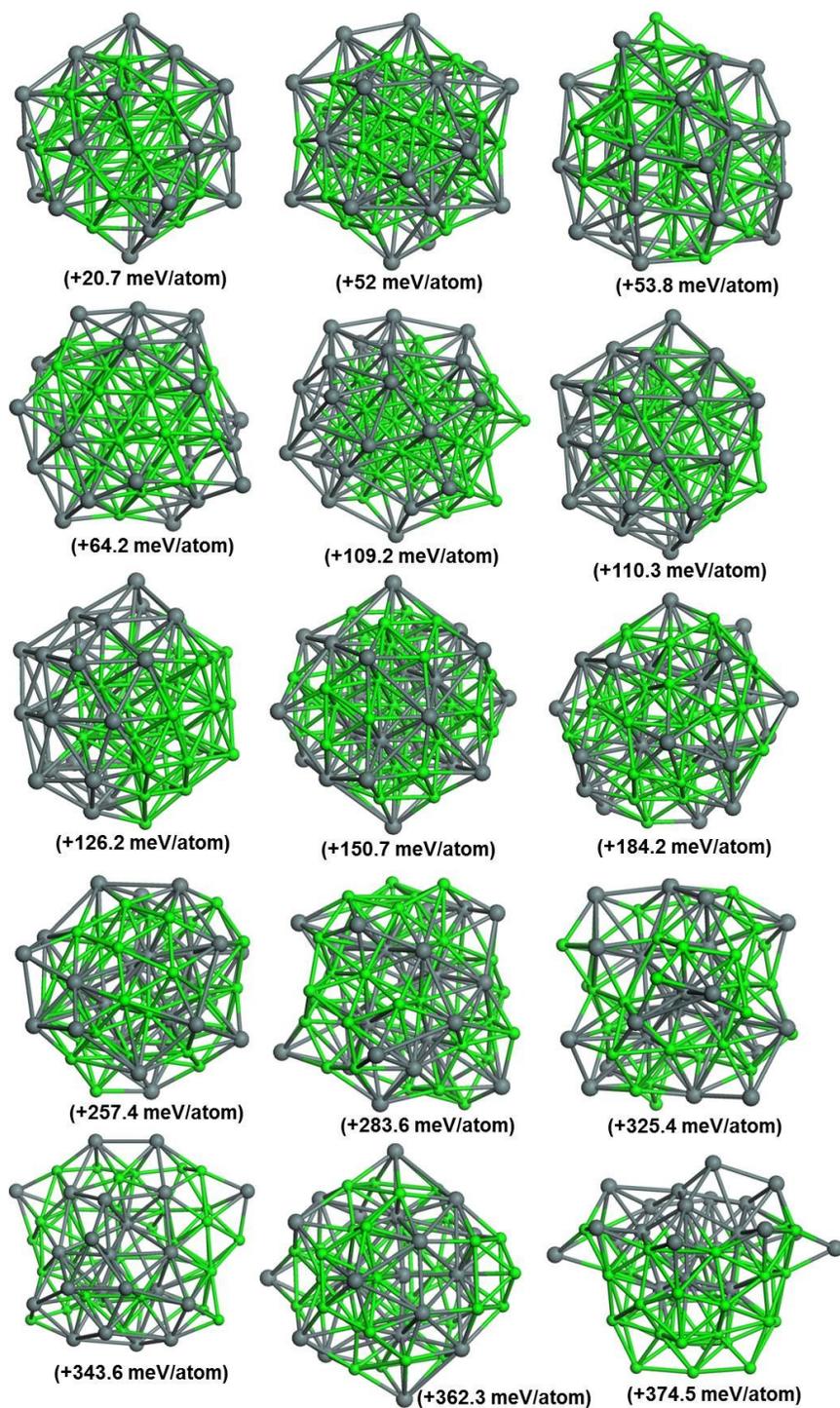


Fig. S4 DFT-optimized isomers of $\text{Ru}_{33}\text{Sn}_{22}$ nanoclusters. For each structure, the relative energy is given in brackets. Color legend: Ru in green and Sn in gray. The Sn elements are shown in bigger size balls.

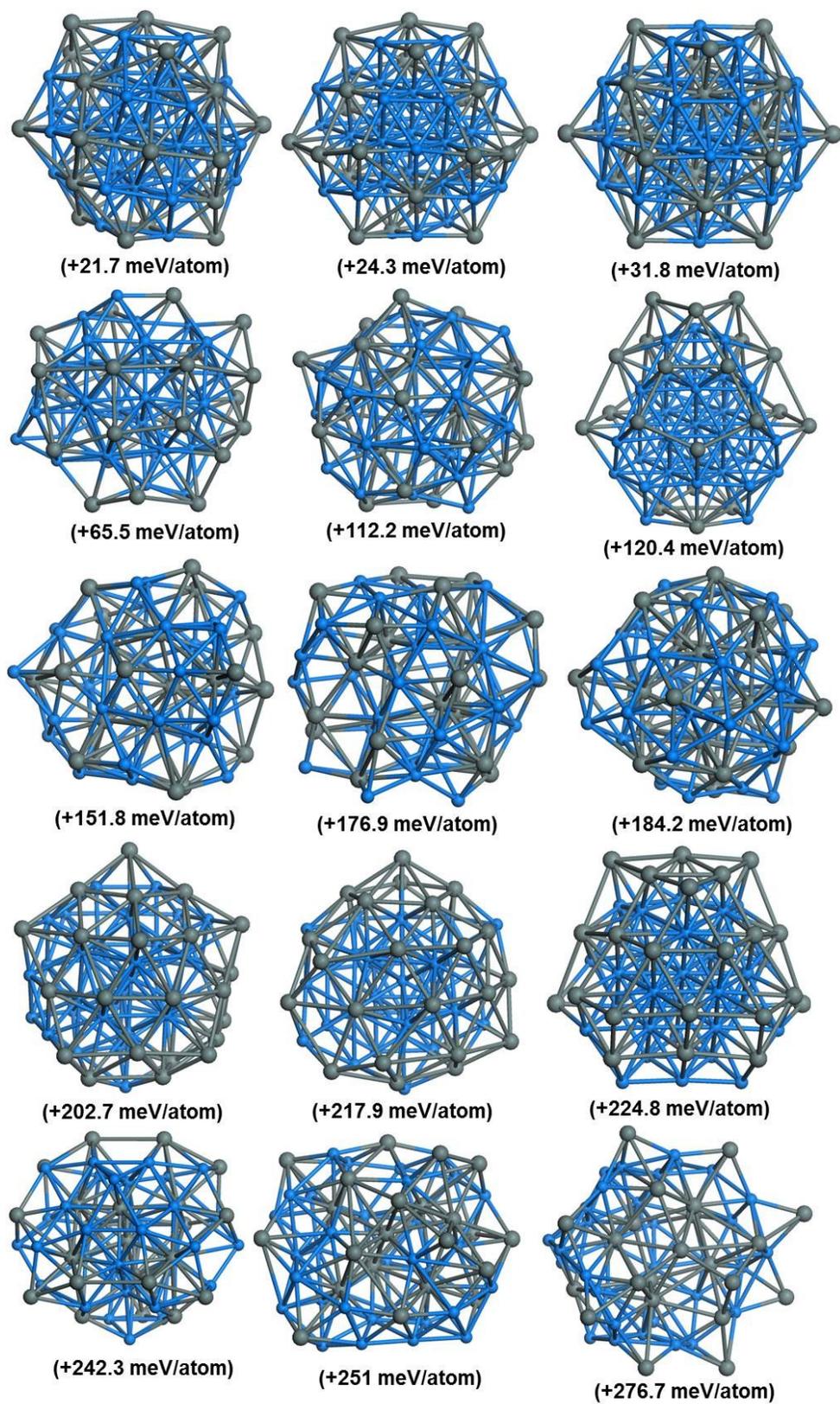


Fig. S5 DFT-optimized isomers of $\text{Rh}_{33}\text{Sn}_{22}$ nanoclusters. For each structure, the relative energy is given in brackets. Color legend: Rh in blue and Sn in gray. The Sn elements are shown in bigger size balls.

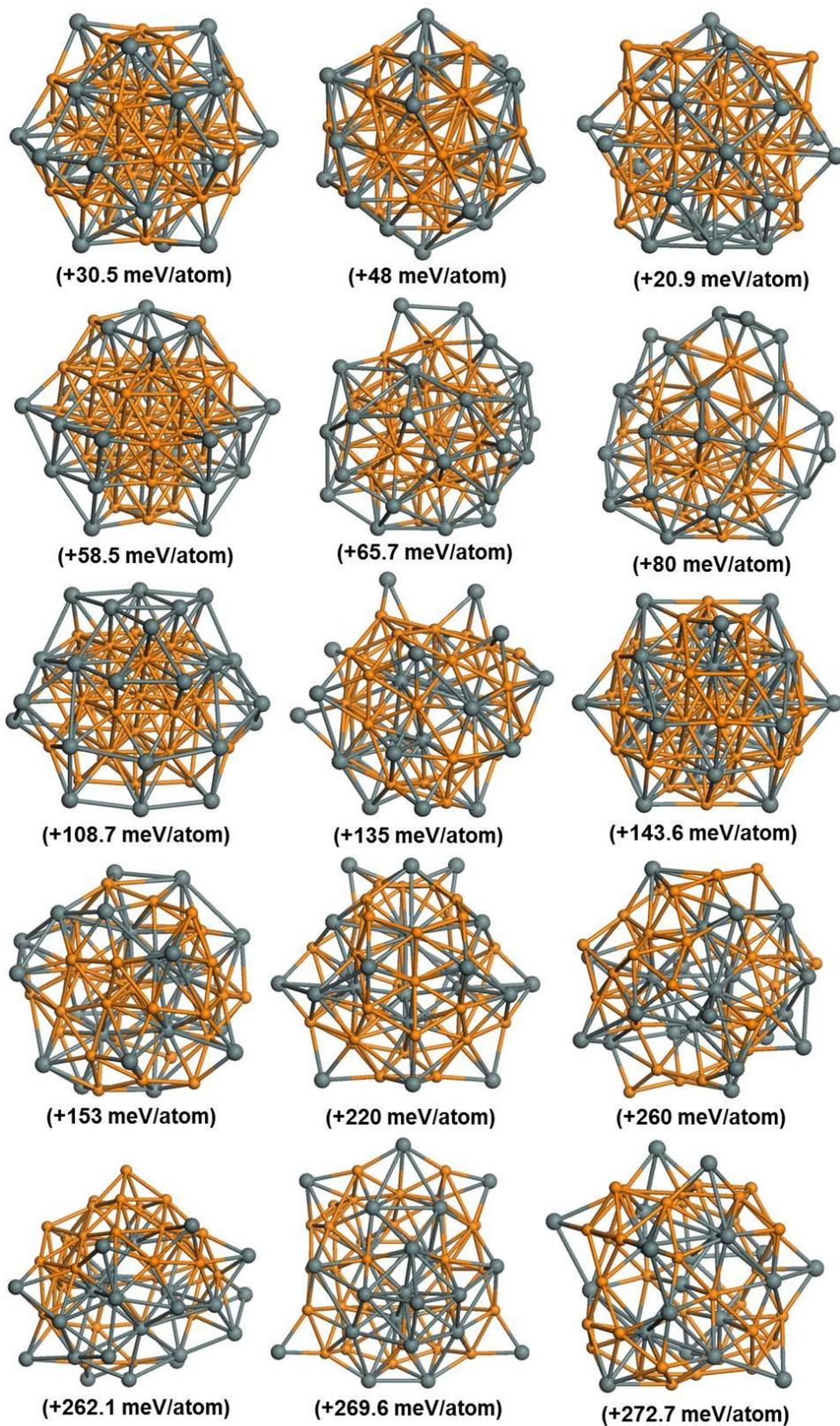


Fig. S6 DFT-optimized isomers of $\text{Ir}_{33}\text{Sn}_{22}$ nanoclusters. For each structure, the relative energy is given in brackets. Color legend: Ir in orange and Sn in gray. The Sn elements are shown in bigger size balls.

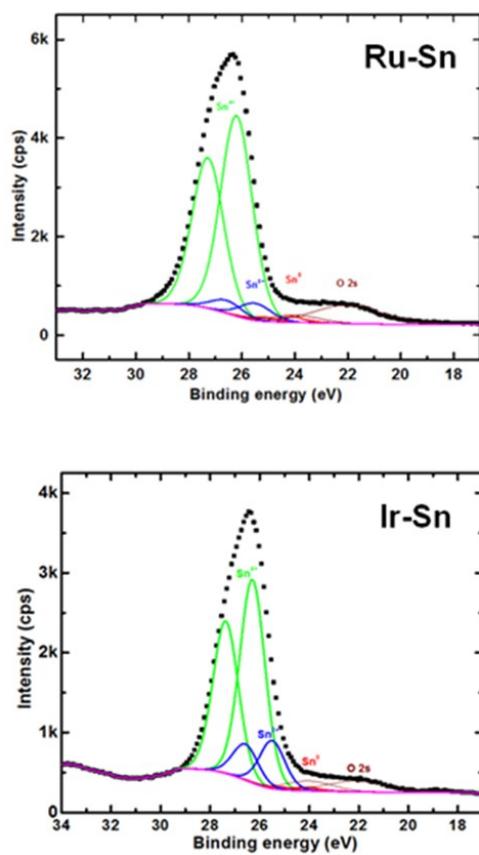


Fig. S7 XPS spectrum of the Sn 4d core level measured from as-synthesized Ru-Sn and Ir-Sn bimetallic samples.

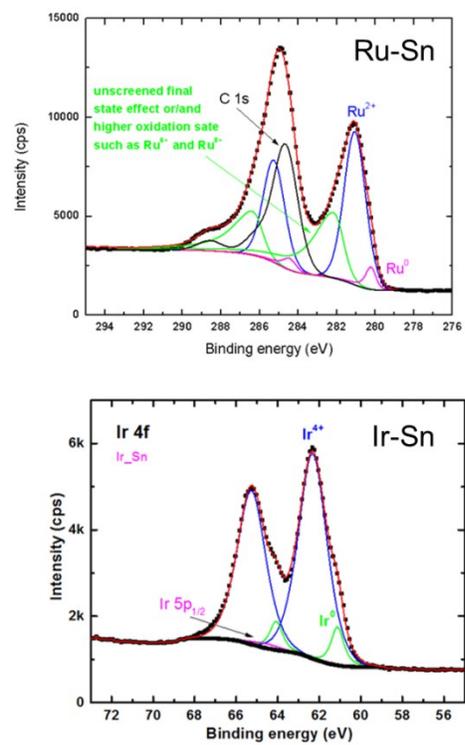


Fig. S8 XPS spectra of the Ru3d and Ir 4f core level measured from as-synthesized Ru-Sn and Ir-Sn bimetallic samples.

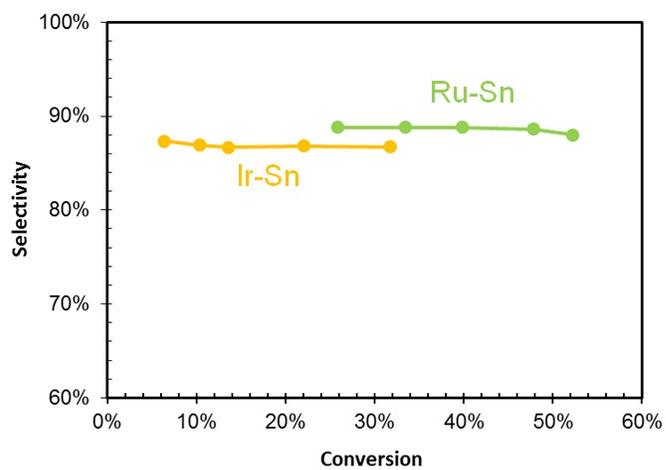


Fig. S9 Conversion versus selectivity in ethyl acetate hydrogenolysis reaction over Ru-Sn and Ir-Sn catalysts at 320 °C.

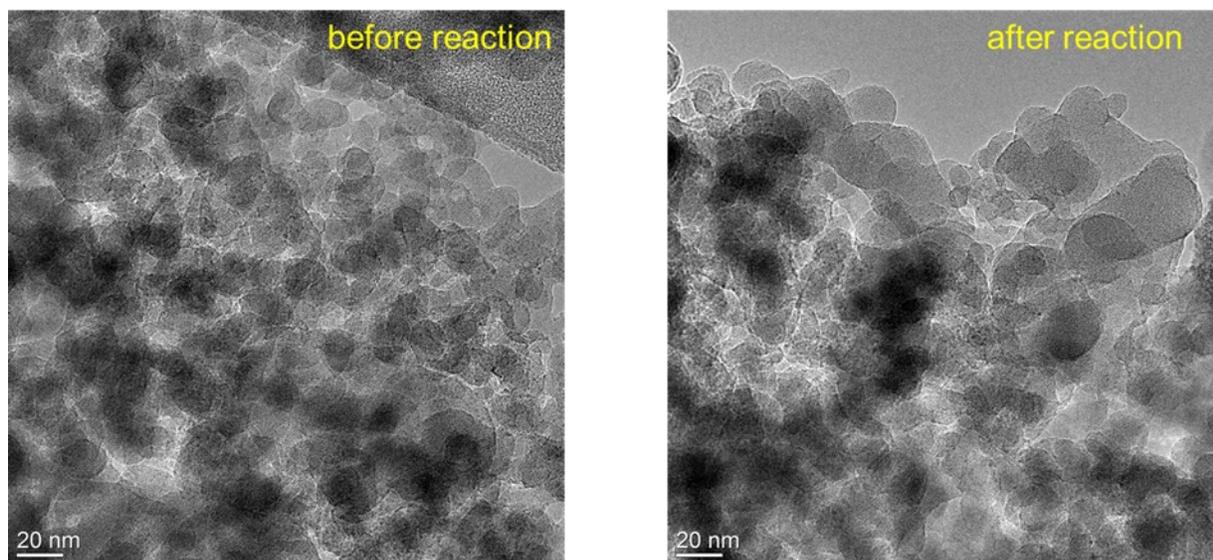


Fig. S10 TEM images of Rh-Sn/SiO₂ catalyst before and after hydrogenolysis reaction.