

## Supplementary Information

The supplementary information includes five figures and two tables, and the main content is described as follows.

Fig. S1 shows the typical TEM images and the particle size distribution of PtSn<sub>0.94</sub>/LOC-NP and PtSn<sub>0.94</sub>/LOC-CI catalysts.

Fig. S2 gives the cycle experiment for CRAL hydrogenation on the Pt/LOC and PtSn<sub>0.94</sub>/LOC.

Fig. S3 shows the standard patterns of hexagonal La<sub>2</sub>O<sub>2</sub>CO<sub>3</sub> and hexagonal La<sub>2</sub>O<sub>3</sub>, XRD patterns of the Pt/LOC-C and PtSn<sub>0.94</sub>/LOC-C.

Fig. S4 displays the HAADF-STEM images of the Pt/LOC-C and PtSn<sub>0.94</sub>/LOC-C, and the size distribution of metal particles in the inserted histograms.

Fig. S5 presents the Pt 4f and Sn 3d spectra of the Pt/LOC-C and PtSn<sub>0.94</sub>/LOC-C.

Table S1 shows the catalytic hydrogenation results of CRAL over the PtSn<sub>0.94</sub>/LOC-NP and PtSn<sub>0.94</sub>/LOC-CI catalysts.

Table S2 summarizes the physicochemical properties of the Pt/LOC-C and PtSn<sub>0.94</sub>/LOC-C determined by ICP-OES and XPS measurements.

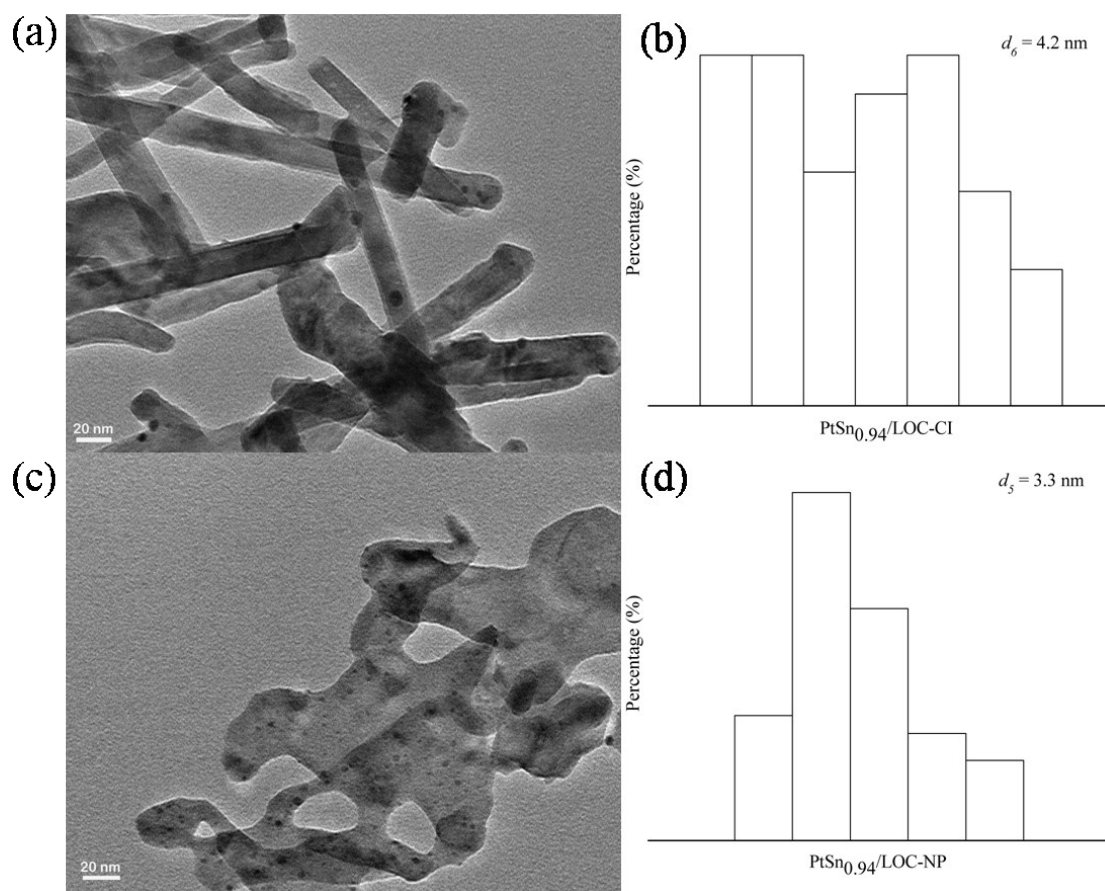


Fig. S1 Typical TEM images and the particle size distribution of PtSn<sub>0.94</sub>/LOC-NP and PtSn<sub>0.94</sub>/LOC-CI catalysts.

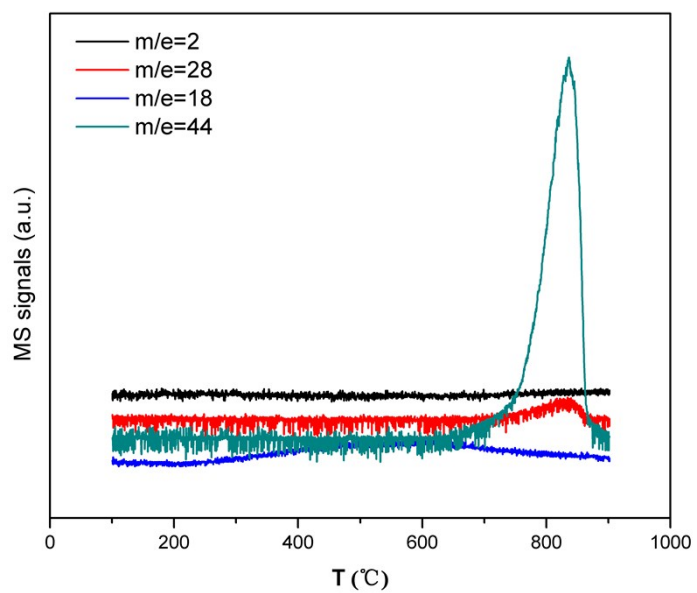
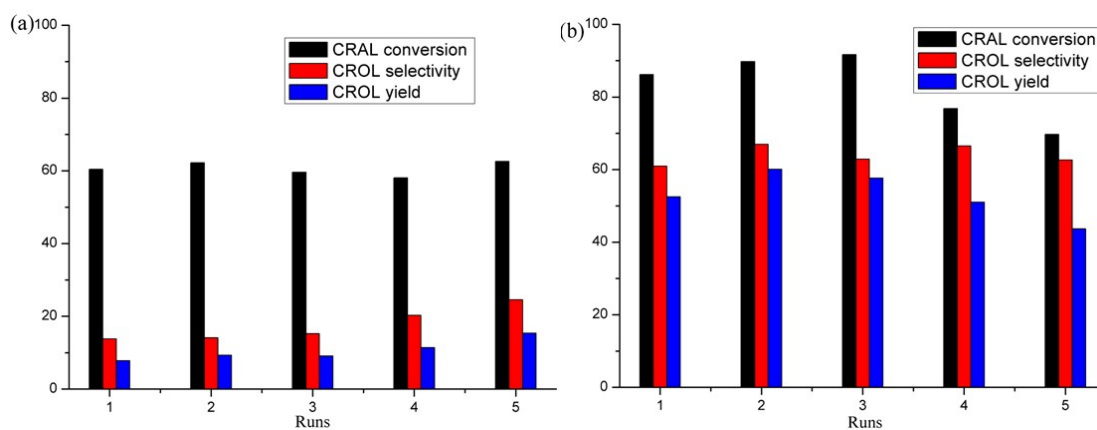
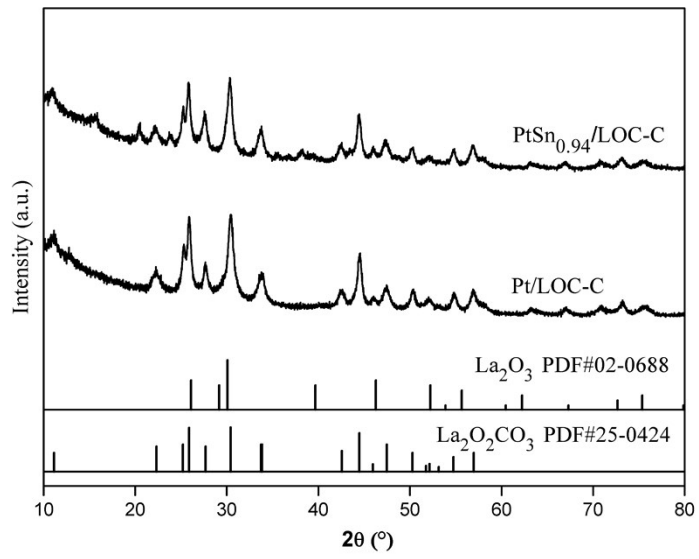


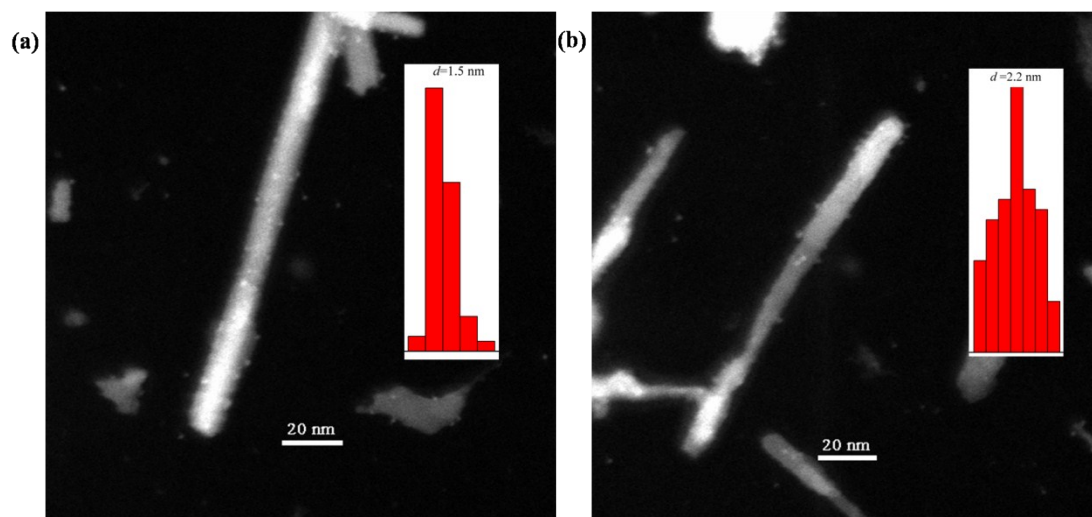
Fig. S2 The TPD-MS synchronous experiment on bare  $\text{La}_2\text{O}_2\text{CO}_3$  nanorods.



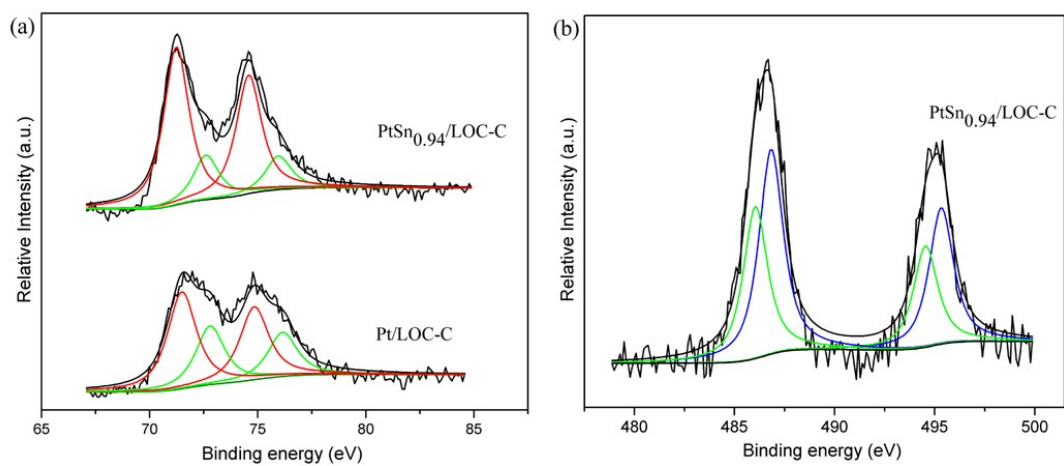
**Fig. S3** The cycle experiment for liquid-phase CRAL hydrogenation over the (a) Pt/LOC and (b) PtSn<sub>0.94</sub>/LOC. Reaction conditions: 1 mL CRAL catalyzed by 100 mg catalyst in 19 mL ethanol,  $T = 160\text{ }^{\circ}\text{C}$ ,  $p = 2.0\text{ MPa}$ ,  $t = 60\text{ min}$ .



**Fig. S4** Standard patterns of hexagonal La<sub>2</sub>O<sub>2</sub>CO<sub>3</sub> and hexagonal La<sub>2</sub>O<sub>3</sub>, XRD patterns of the cycled catalysts.



**Fig. S5** HAADF-STEM images of the cycled (a) Pt/LOC-C and (b) PtSn<sub>0.94</sub>/LOC-C; the inserted histograms showing the size distribution of metal particles over the cycled catalysts.



**Fig. S6** (a) Pt 4f and (b) Sn 3d XPS spectra (black line) and fitting curves (green or blue line) for the samples. The curve fitting results of Pt 4f and Sn 3d spectra for the samples are attained using the XPSPEAK41 software according to the uniform constraints on the fitting parameters after subtracting the background.

**Table S1** The hydrogenation results of CRAL over the contrast catalysts<sup>a</sup>

Catalyst	<i>Conv.</i> <sub>CRAL</sub> (%)	<i>Sel.</i> (%)			Yield <sub>CROL</sub> (%)
		BUAL	BUOL	CROL	
PtSn <sub>0.94</sub> /LOC-CI	81.2	23.0	15.0	62.0	50.4
PtSn <sub>0.94</sub> /LOC-NP	79.6	25.5	20.2	54.3	43.2

<sup>a</sup> Reaction conditions: 1 mL CRAL catalyzed by 100 mg of the catalyst in 19 mL ethanol,  $T = 160\text{ }^{\circ}\text{C}$ ,  $p = 2.0\text{ MPa}$ ,  $t = 60\text{ min}$ .



**Table S2** Physicochemical properties of the cycled catalysts determined by ICP-OES and XPS.

Catalyst	wt.%Pt <sup>a</sup>	wt.%Sn <sup>a</sup>	Sn/Pt <sup>a</sup>	BE (eV)	Species	Pt <sup>2+</sup> /Pt <sup>0b</sup>	BE (eV)	Species	Atomic ratio	
									Pt/La <sup>c</sup>	Sn/Pt <sup>d</sup>
Pt/LOC-C	1.10	-	-	71.5	Pt <sup>0</sup>	0.67			0.021	
				72.8	Pt <sup>2+</sup>					
PtSn <sub>0.94</sub> /LOC-C	1.04	0.46	0.73	71.2	Pt <sup>0</sup>	0.28	486.0	Sn <sup>2+</sup>	0.018	1.14
				72.6	Pt <sup>2+</sup>		487.8	Sn <sup>4+</sup>		

<sup>a</sup>From the ICP-OES analyses.

<sup>b</sup>Pt<sup>2+</sup>/Pt<sup>0</sup>: the atomic ratio of oxidized platinum (Pt<sup>2+</sup>) to metallic platinum (Pt<sup>0</sup>). <sup>c</sup>the molar ratio of Pt to La. <sup>d</sup>the molar ratio of Sn to Pt.