

## Electronic Supplementary Information

### **Electrostatic interaction based hollow Pt and Ru assemblies toward methanol oxidation**

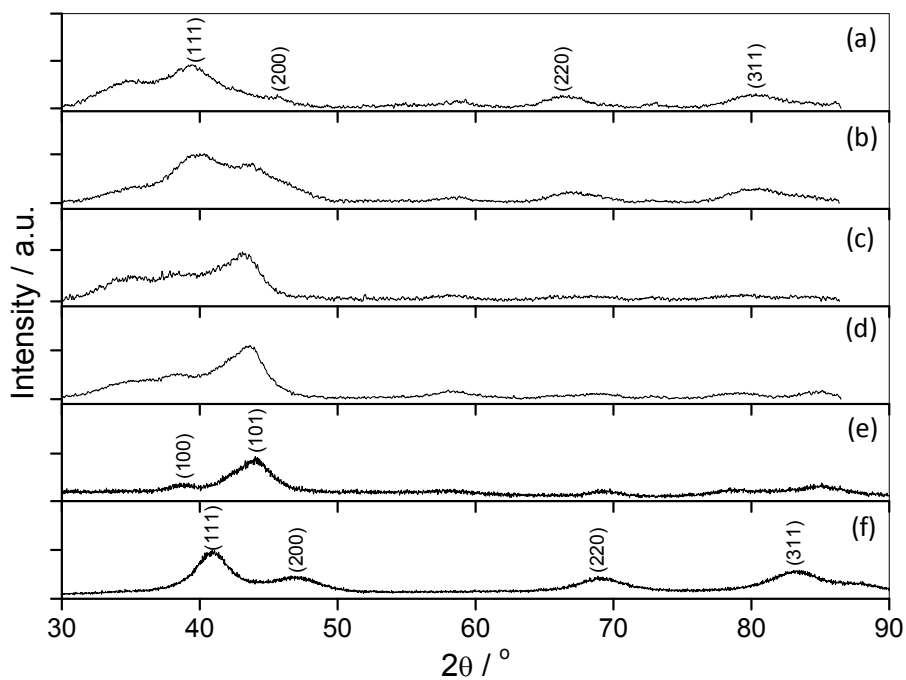
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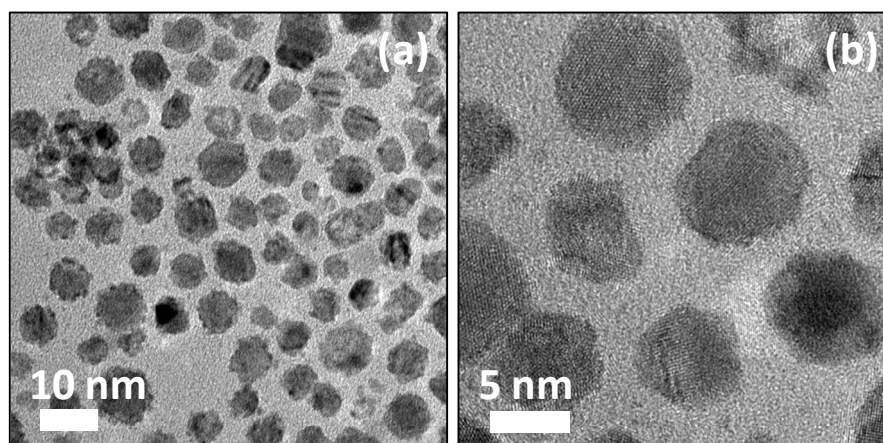
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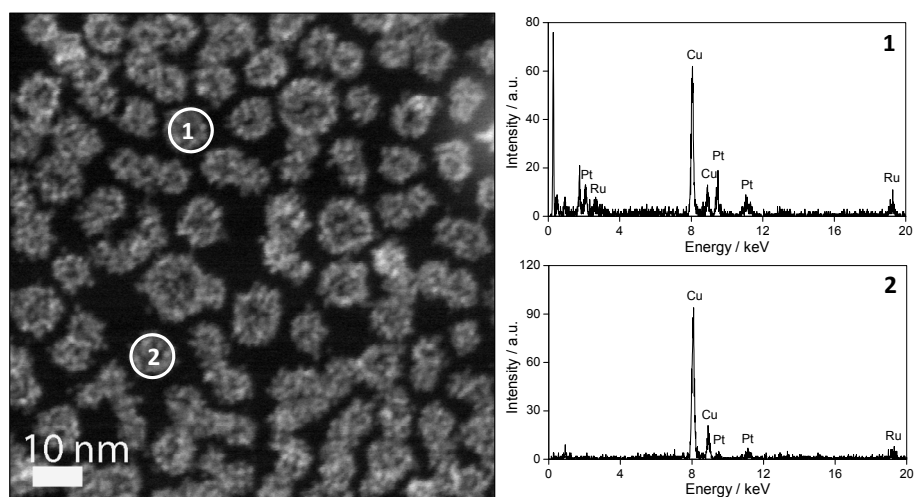
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**Fig. S1** XPD patterns of hPt (a), hPt-Ru assemblies at Pt/Ru molar ratio of 2:1 (b), hPt-Ru assemblies at Pt/Ru molar ratio of 1:1 (c), hPt-Ru assemblies at Pt/Ru molar ratio of 1:2 (d), Ru (e), and commercial PtRu/C catalysts (f).



**Fig. S2** TEM image (a) and HRTEM image (b) of core-shell Ag-Pt nanoparticles, which were used subsequently to synthesize hollow Pt nanospheres by BSPP treatment.



**Fig. S3** STEM image of electrostatic interaction based hPt-Ru assemblies at Pt/Ru molar ratio of 1:1 and EDX analyses of the assembled particles labeled as 1 and 2 respectively in the STEM image.

**Table S1** Electrochemical measurements of methanol oxidation on commercial PtRu/C catalysts, hPt nanospheres, and hPt-Ru assemblies at different Pt/Ru ratios. The data were obtained from Fig. 5a.

Materials	Forward Scan Peak Potential (V)	Forward Scan Peak Current Density (mA cm <sup>-2</sup> )	Backward Scan Peak Potential (V)	Backward Scan Peak Current Density (mA cm <sup>-2</sup> )
PtRu/C	0.66	7.04	0.46	3.36
hPt	0.68	6.86	0.52	5.45
hPt-Ru (2:1)	0.70	14.5	0.54	10.6
hPt-Ru (1:1)	0.70	10.9	0.54	8.69
hPt-Ru (1:2)	0.66	8.65	0.50	5.30

**Table S2** The electrochemically active surface area (ECSA) of commercial PtRu/C catalysts, hPt nanospheres, and hPt-Ru assemblies at different Pt/Ru ratios. The data were obtained from Fig. 5d.

Catalysts	ECSA (m <sup>2</sup> g <sup>-1</sup> )
PtRu/C	36.4
hPt	29.7
Pt-Ru(2:1)	25.3
Pt-Ru(1:1)	22.0
Pt-Ru(1:2)	14.4