Supporting Information

Shape-Control of Pt-Ru Nanocrystals: Tuning Surface Structure for Enhanced Electrocatalytic Methanol Oxidation

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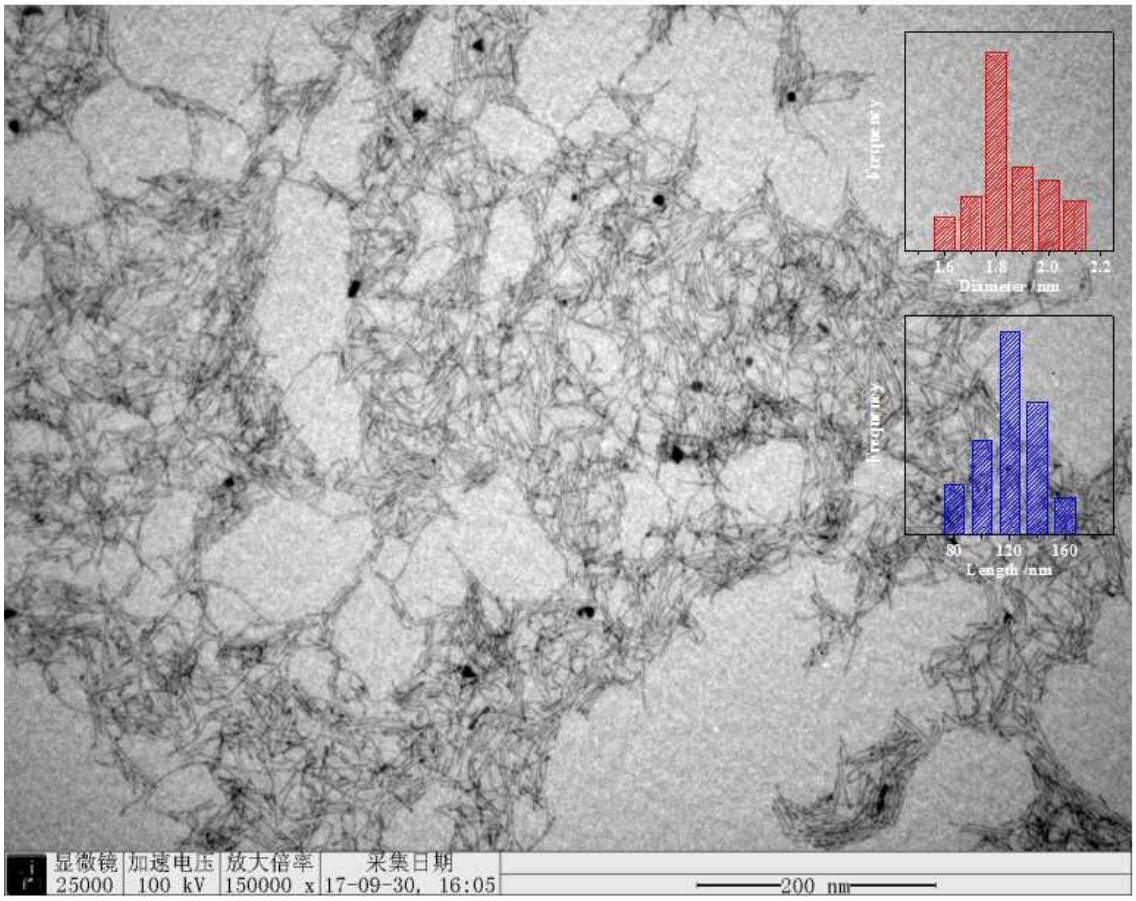


Figure S1. Large-area TEM image of the as-prepared PtRu NWs. The inset shows the histograms of diameter and length of the PtRu NWs.

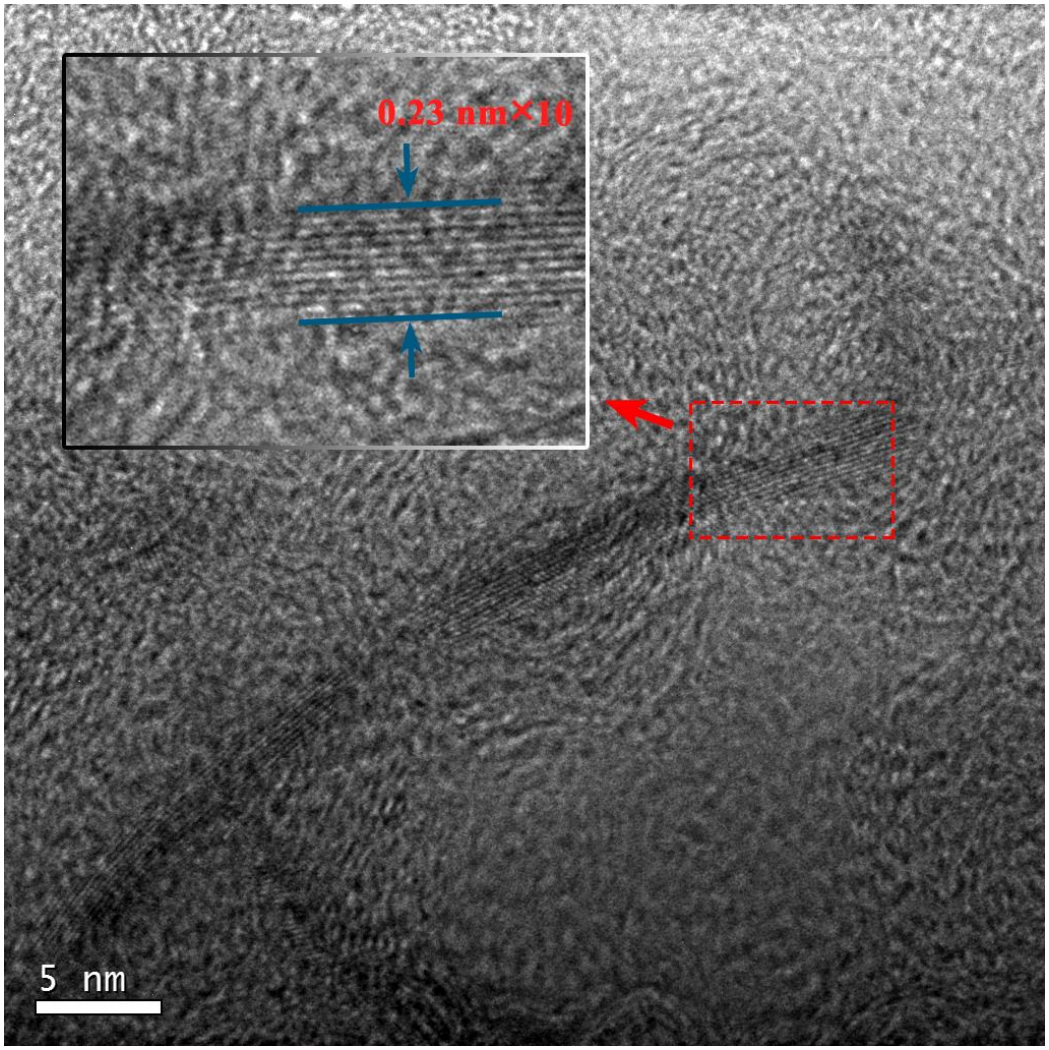


Figure S2. HRTEM image of an individual PtRu NW. The inset is magnified HRTEM image of the selected area.

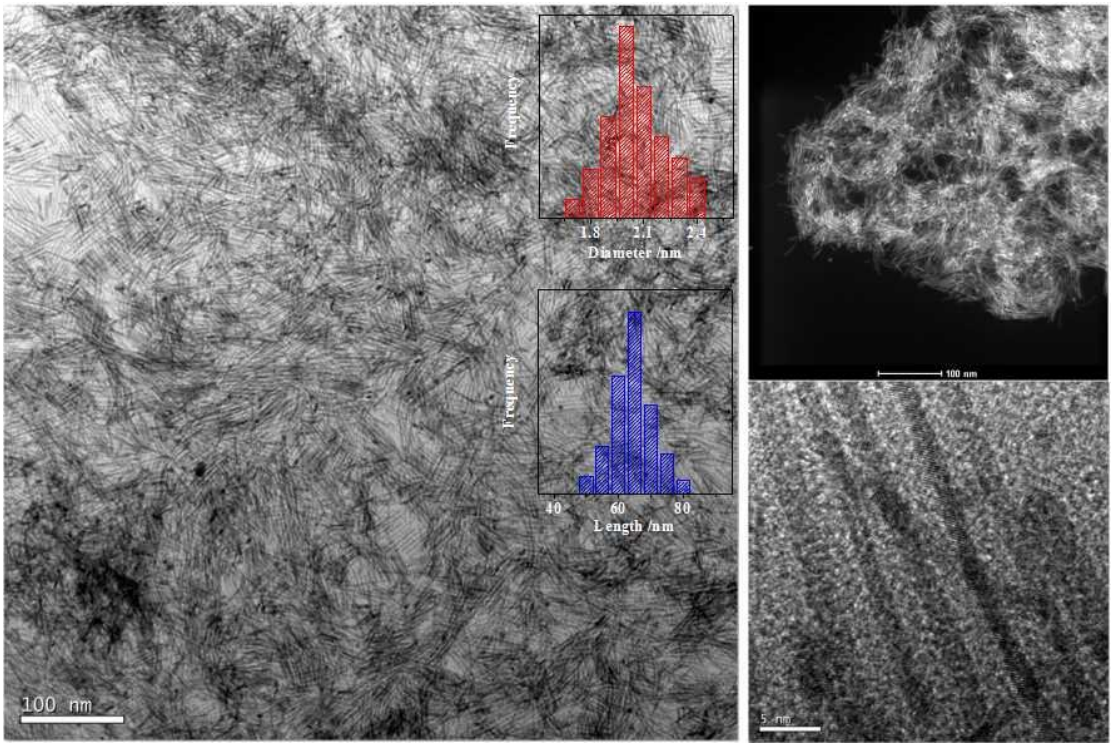


Figure S3. Large-area TEM image, HAADF-STEM image and HRTEM image of the as-prepared PtRu NRs_1. The inset shows the histograms of diameter and length of the $PtRuNRs_1$.

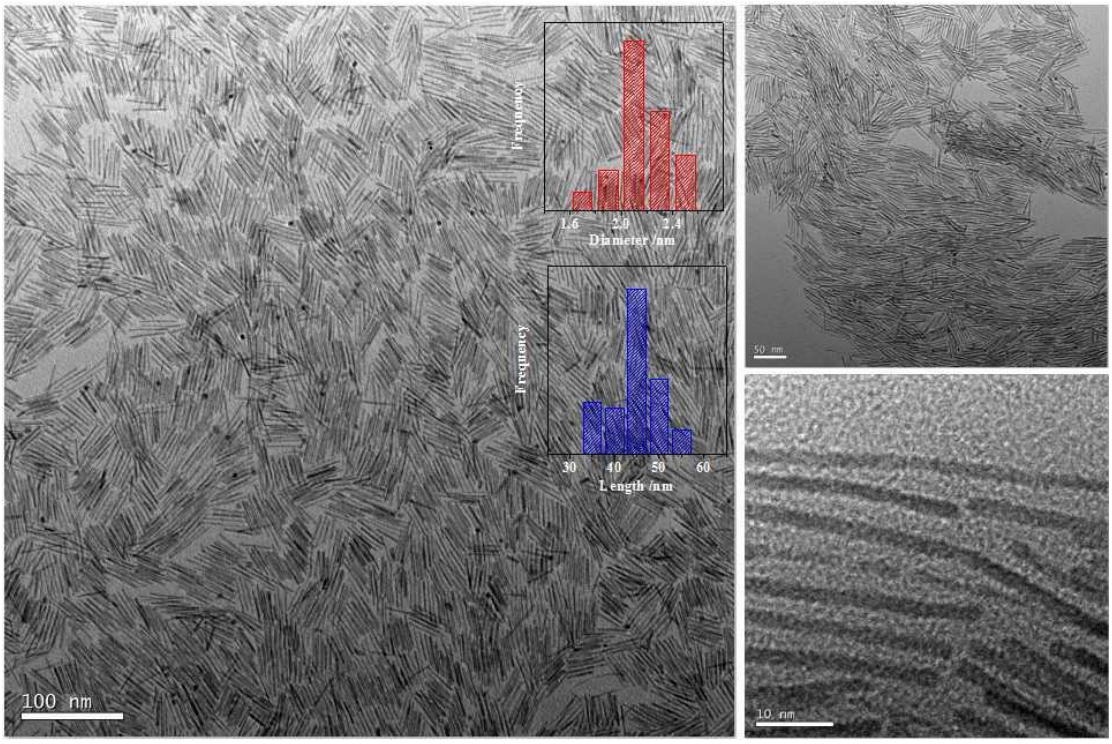


Figure S4. Large-area TEM image and HRTEM image of the as-prepared PtRu NRs_2. The inset shows the histograms of diameter and length of the $PtRuNRs_2$.

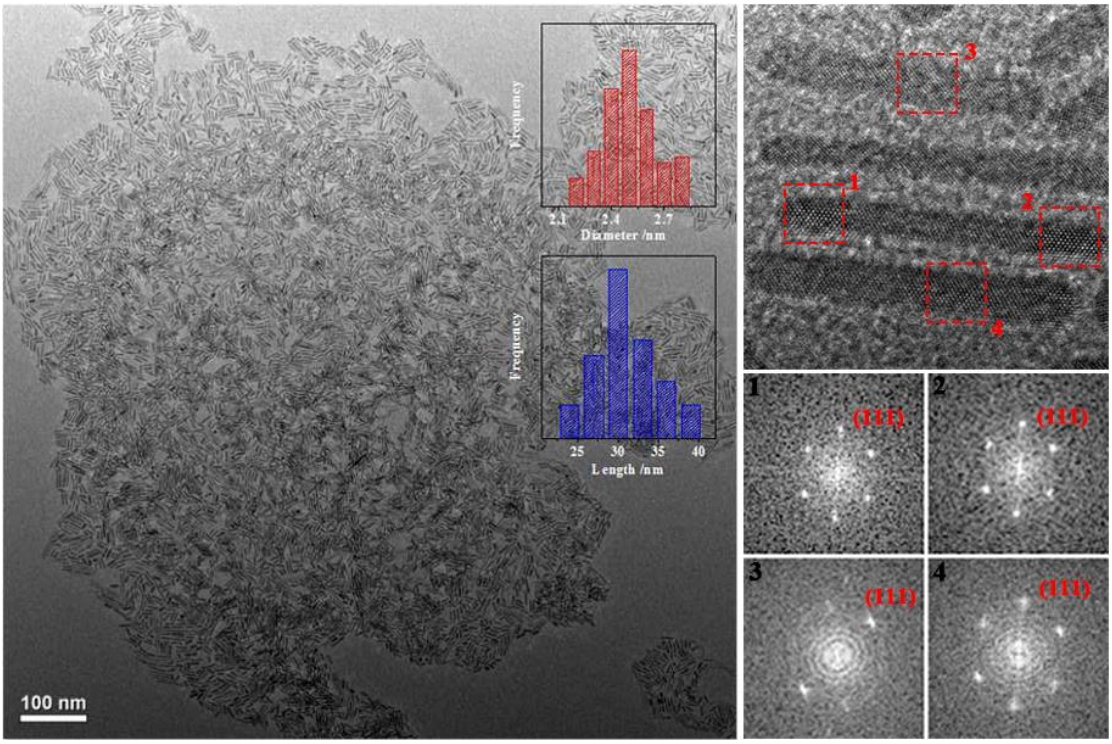


Figure S5. Large-area TEM image, HRTEM image and the corresponding FFT patterns of the as-prepared PtRu NRs_3. The inset in left shows the histograms of diameter and length of the $PtRuNRs_3$.

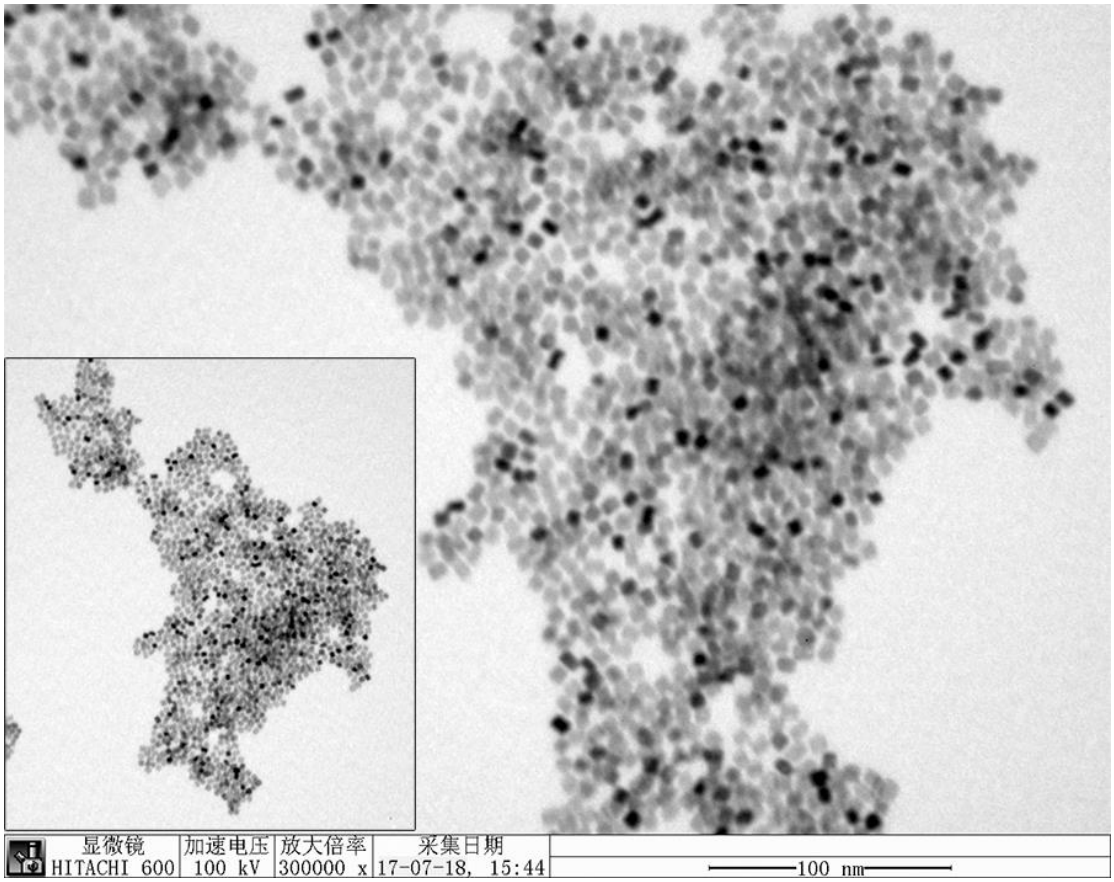


Figure S6. Large-area TEM images of the as-prepared PtRu NCs.

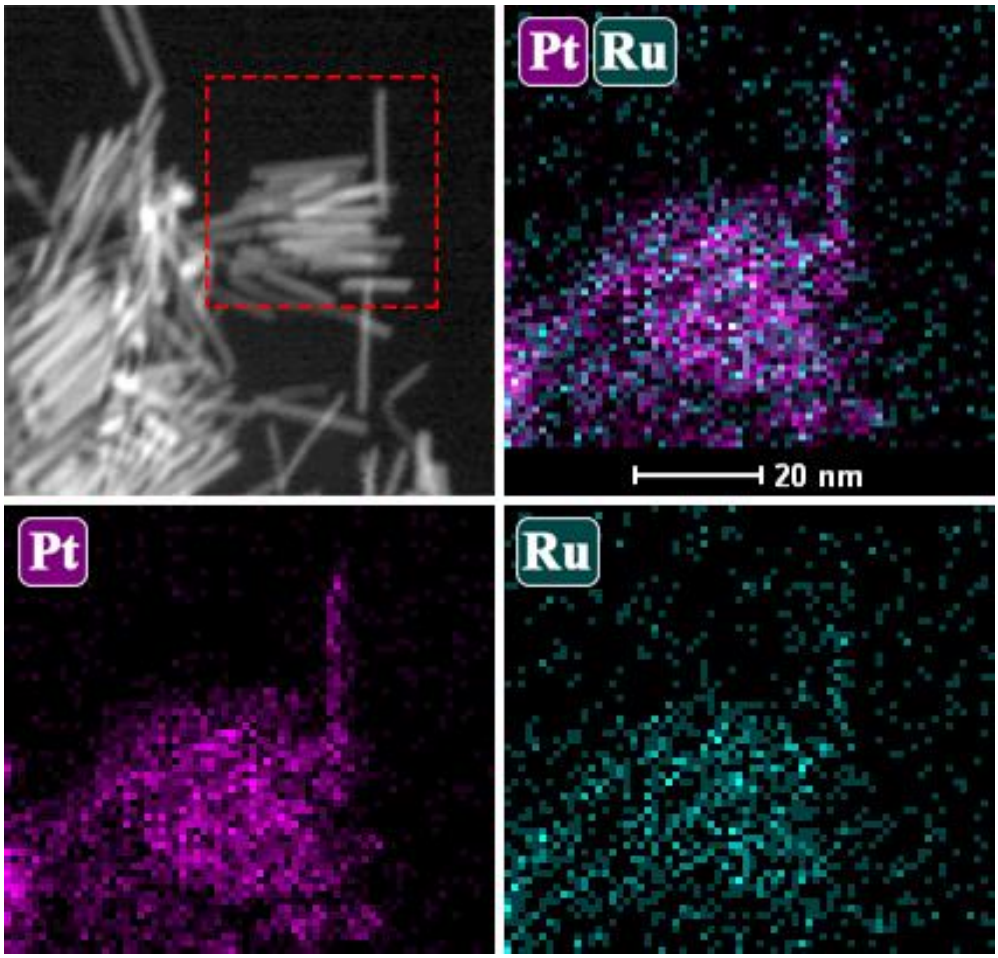
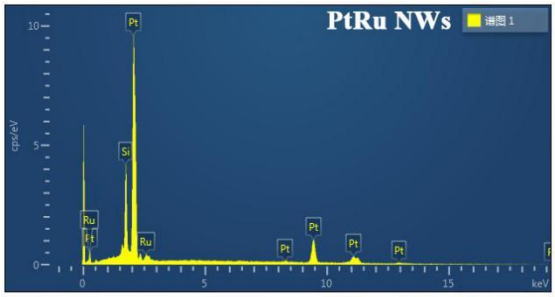
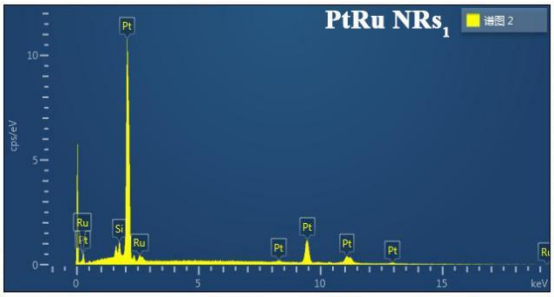
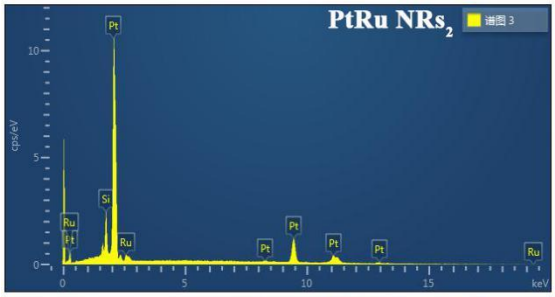
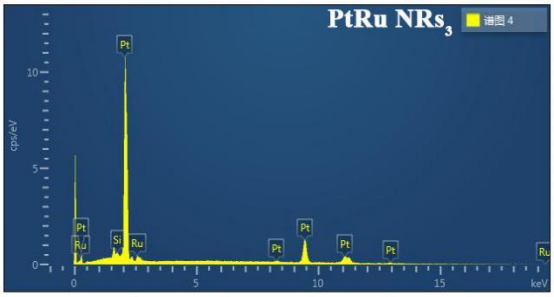


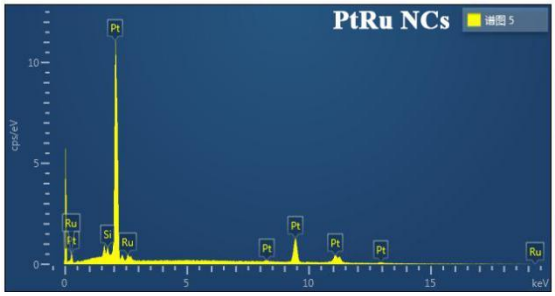
Figure S7. HADDF-STEM image and the corresponding elemental mapping images of the PtRu NRs.











Samples	NWs	NRs_1	NRs_2	NRs_3	NCs
Pt /wt.%	95.17	95.02	95.12	95.05	94.91
Ru /wt.%	4.83	4.98	4.88	4.95	5.09
Pt/Ru atomic ratio	10.2/1	9.85/1	10.1/1	9.94/1	9.72/1

Figure S8. SEM-EDS spectra and the corresponding ICP-AES results of Pt/Ru atomic ratio of the as-prepared PtRu nanocrystals.

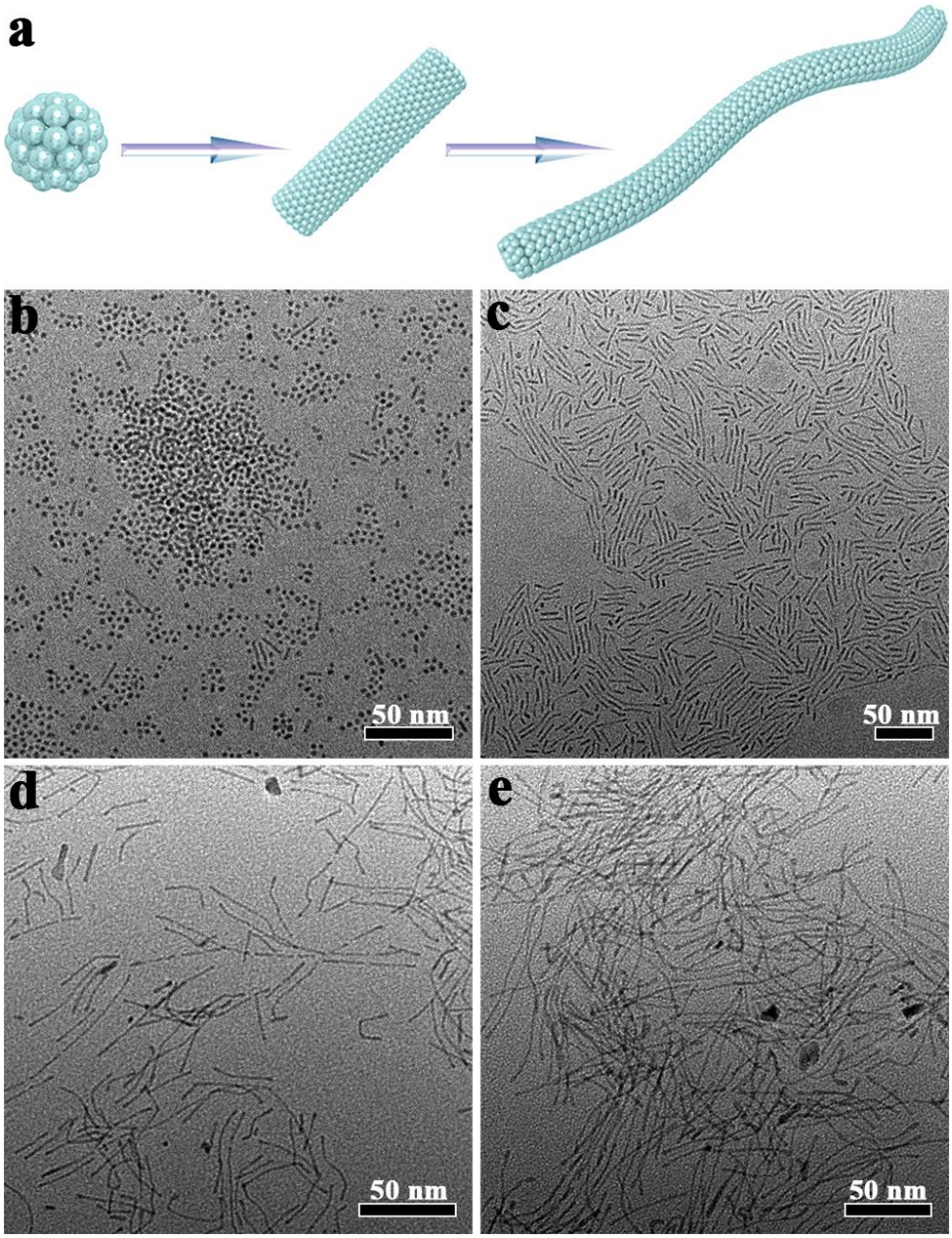


Figure S9. (a) Schematic illustration of the growth mechanism of PtRu NWs, and TEM images of the PtRu NWs collected at (b) 30 min, (c) 1h, (d) 2 h and (e) 3 h of the reaction times, respectively.

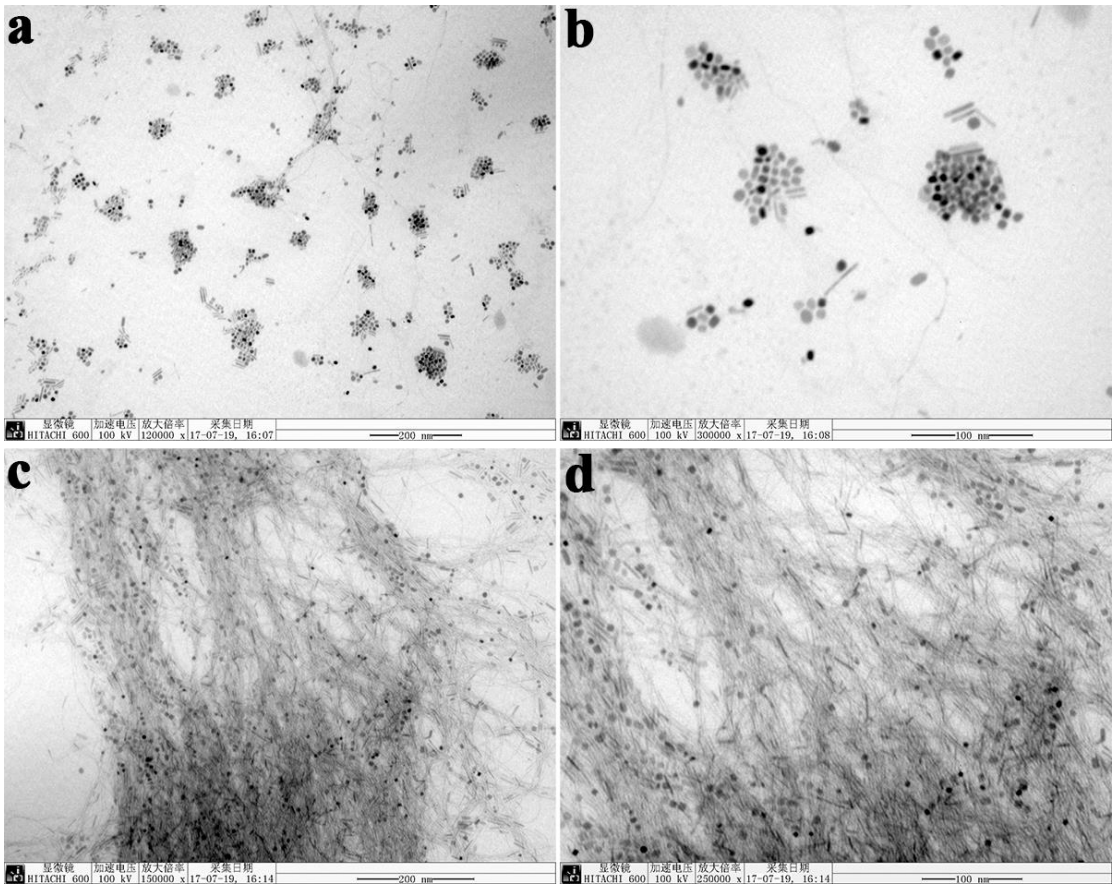


Figure S10. TEM images of the products with the same reaction conditions as PtRu NWs except the use of (a,b) 0 mg and (c,d) 180 mg DDAC.

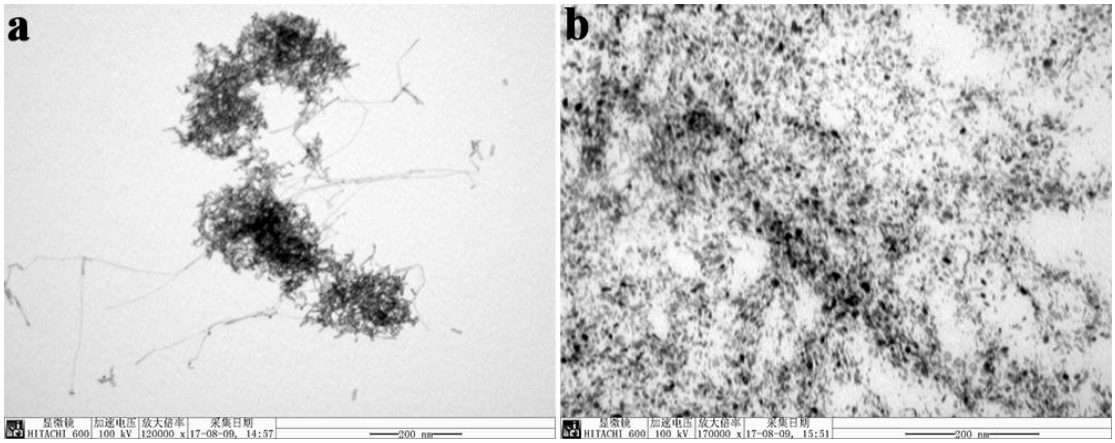


Figure S11. TEM images of the products with the same reaction conditions as PtRu NWs except the use of (a) 5 mg $W(CO)_6$, and (b) the absence of $W(CO)_6$ and DDAC.

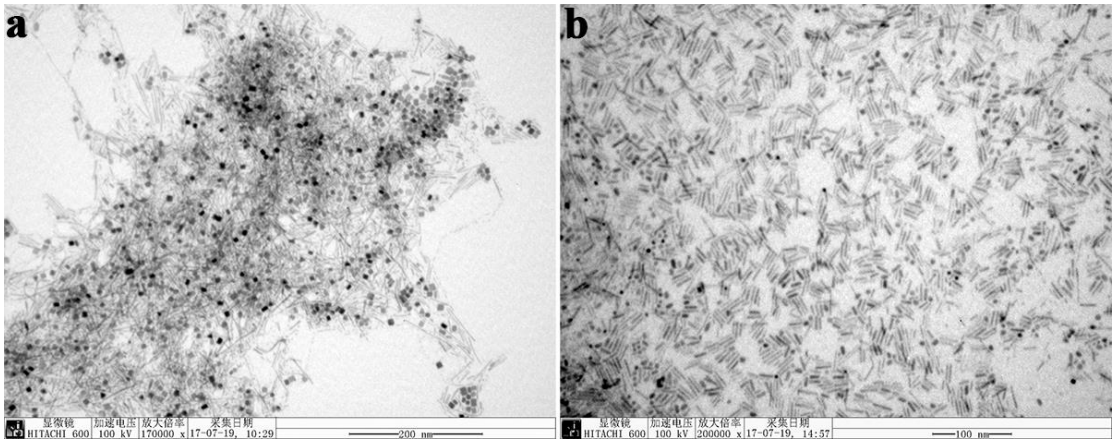


Figure S12. TEM images of the products with the same reaction conditions as PtRu NRs except the use of (a) 20 mg HDBAC, and (b) the absence of $Ru(acac)_3$.

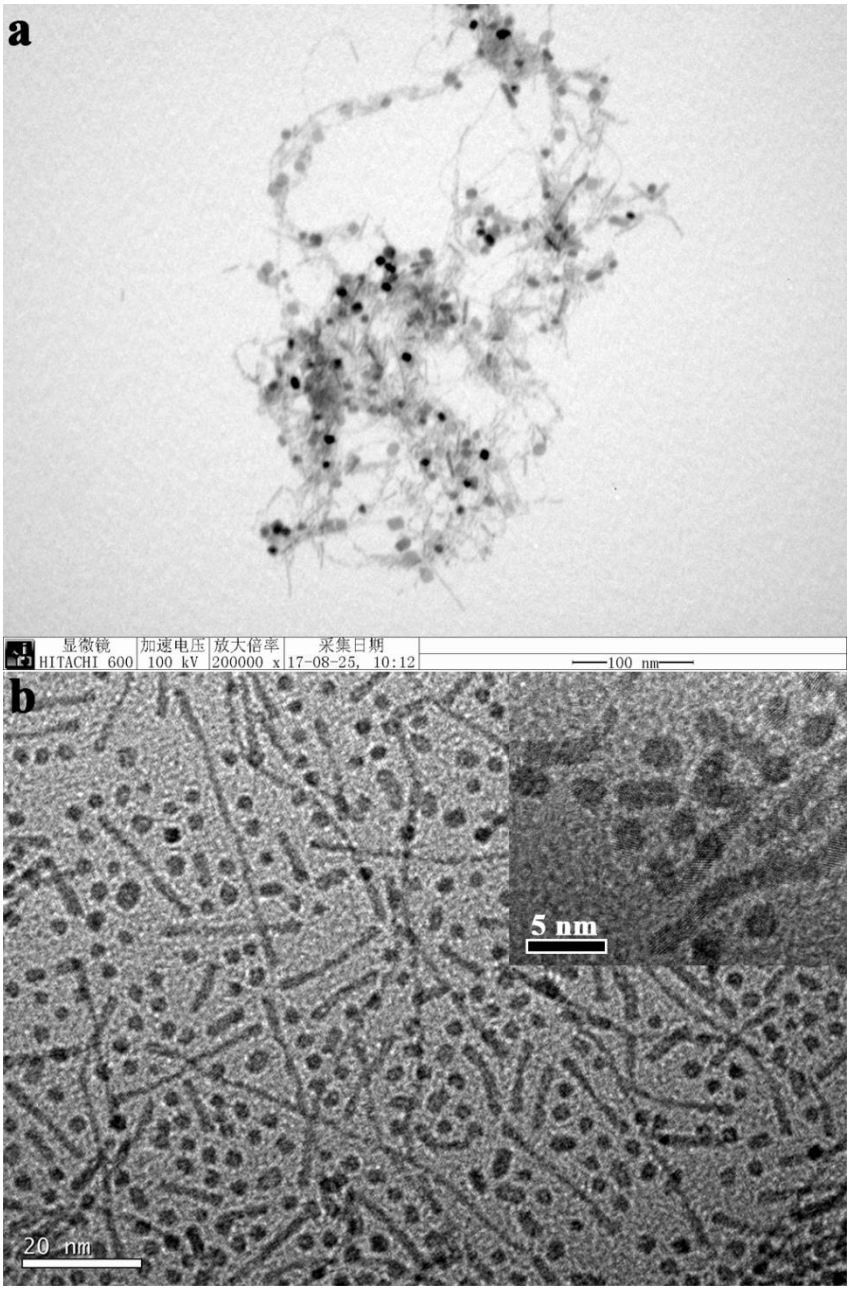


Figure S13. TEM images of the products with the same reaction conditions as PtRu NWs except changing the reaction temperature to (a) 170℃ and (b) 195℃. The inset in (b) is the HRTEM image.

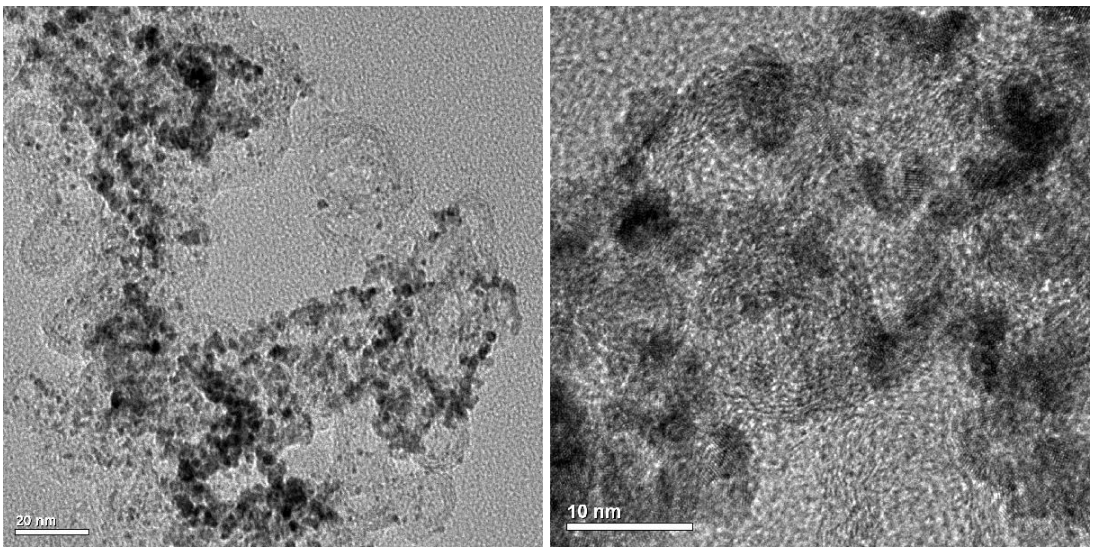


Figure S14. TEM images of commercial PtRu/C catalysts.

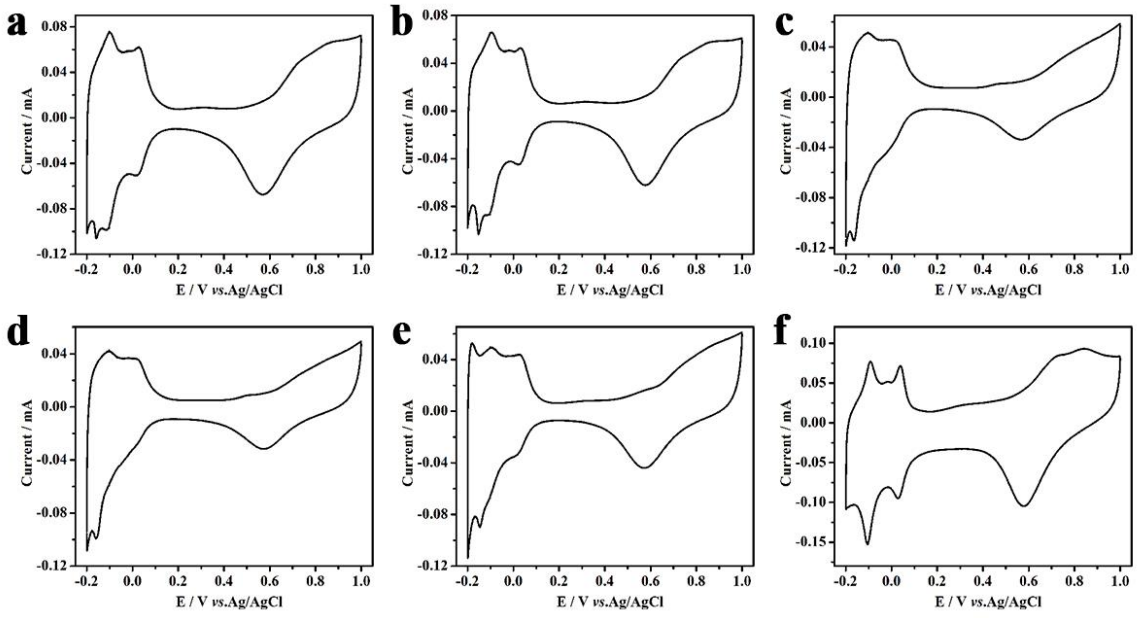


Figure S15. CVs of these catalysts recorded at room temperature in 0.1 M $HClO_4$ solution at a sweep rate of 50 mV s^{-1}, (a) PtRu NWs, (b) PtRu NRs_1, (c) PtRu NRs_2, (d) PtRu NRs_3, (e) PtRu NCs and (f) commercial Pt/C.

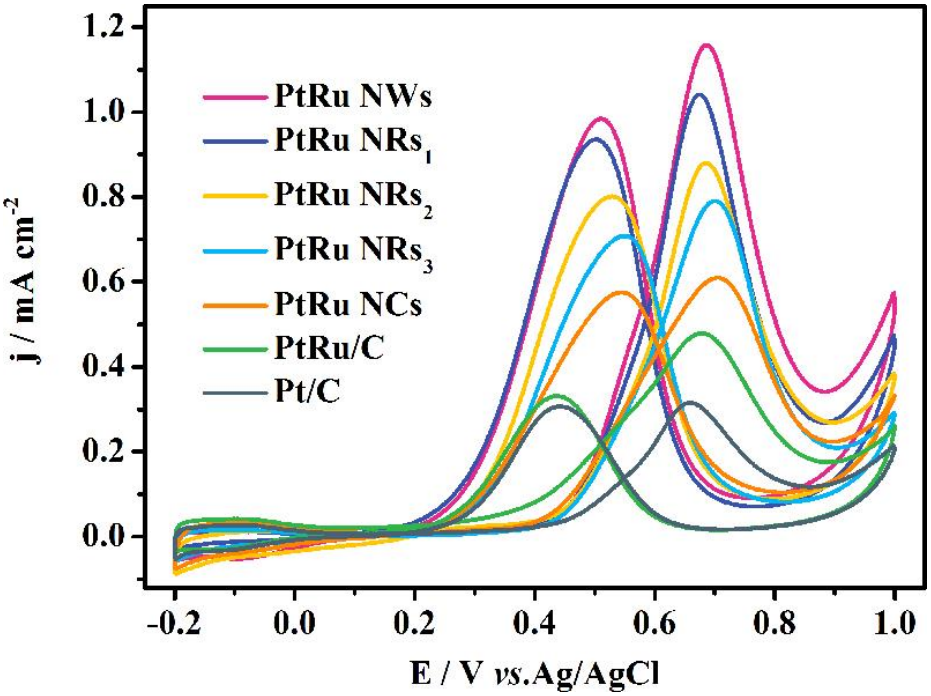


Figure S16. Specific activities of these catalysts by normalizing the MOR current densities with ECSA.

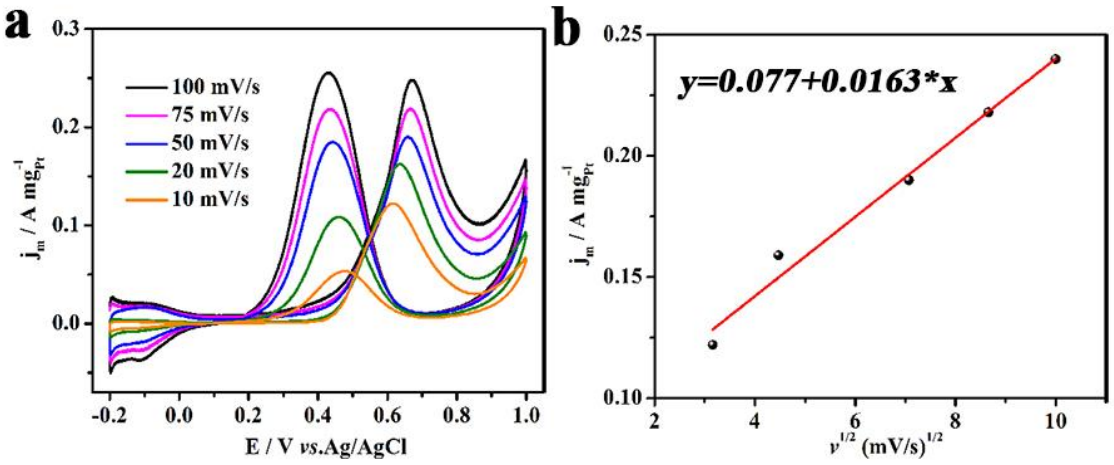


Figure S17. (a) CVs of MOR on commercial Pt/C at different scan rates and (b) the corresponding plot of forward peak current (j_m) versus the square root of the scan rate ($v^{1/2}$).

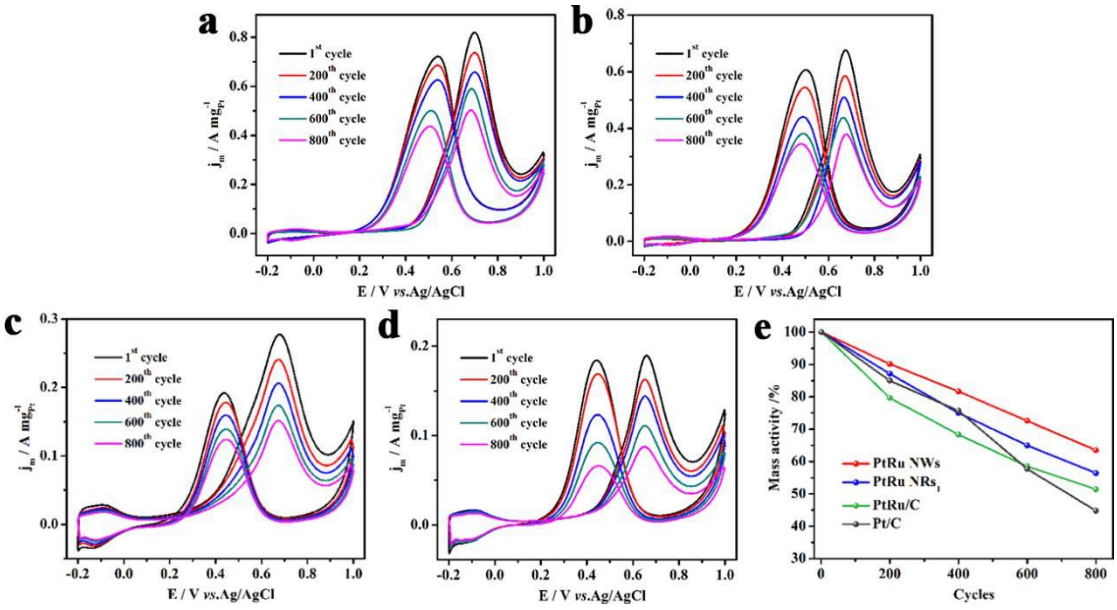


Figure S18. CVs of (a) PtRu NWs, (b) PtRu NRs_1 (c) commercial PtRu/C and (d) commercial Pt/C for MOR in 0.1 M $HClO_4$ + 0.5 M CH_3OH solution. (e) Corresponding mass activities changes of these catalysts before and after 800 potential cycles.

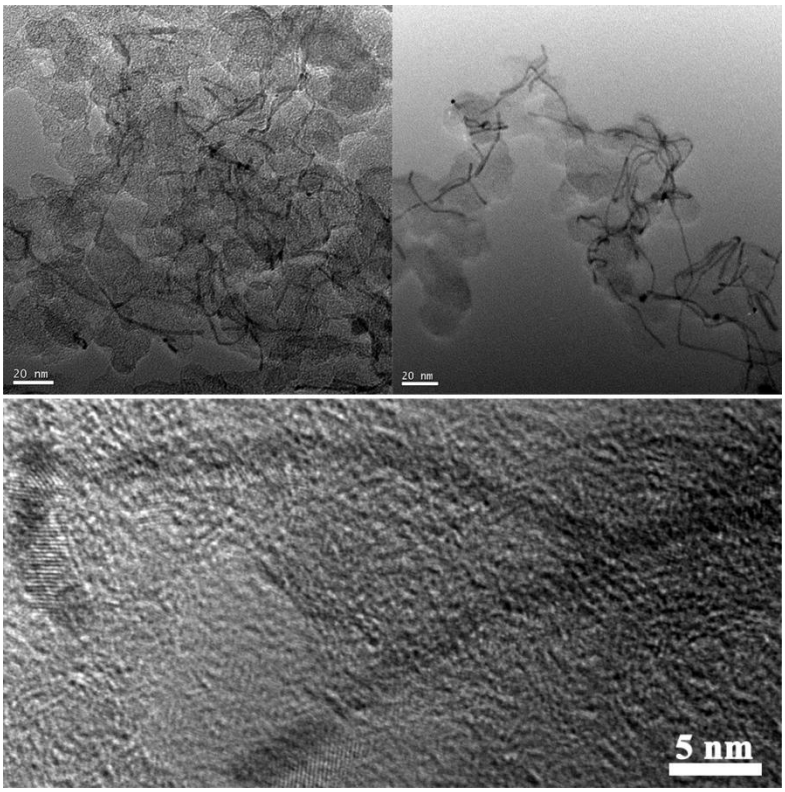


Figure S19. TEM images and HRTEM image of Vulcan XC-72 carbon supported PtRu NWs catalyst.

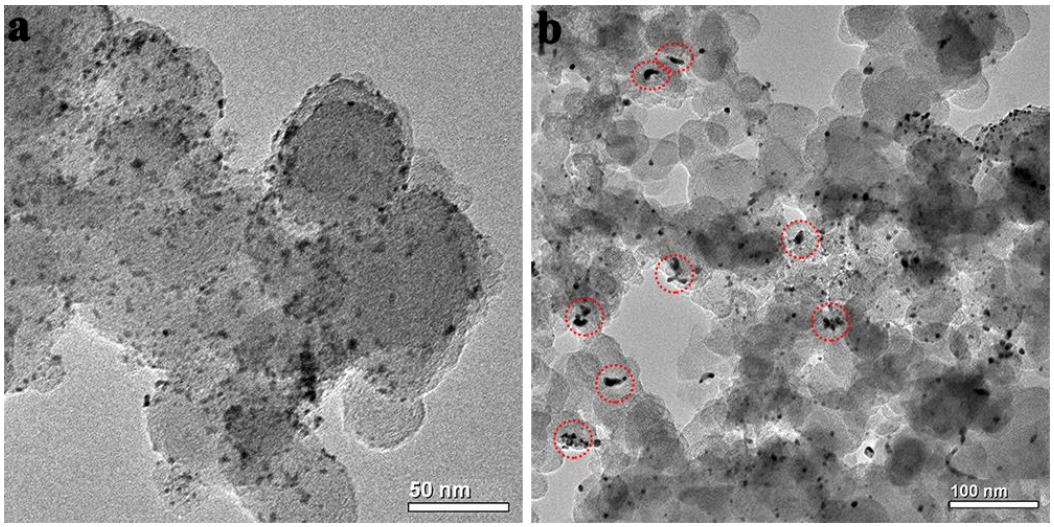


Figure S20. TEM images of commercial Pt/C catalyst before (a) and after (b) 800 potential cycles.