Electronic Supplementary Material (ESI) for Nanoscale.

Supporting information for

3D PtAu Nanoframe Superstructure as High-Performance Carbon-Free Electrocatalyst

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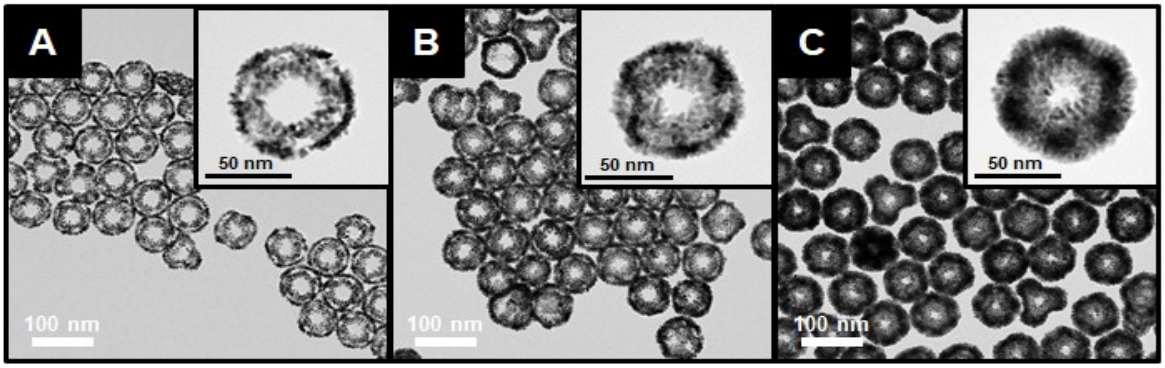


Figure S1 SEM image of TOh PtAu NFs with different thickness. Thickness can be controlled by controlling the amount of H_2PtCl_6 precursor: (A) 11 μM, (B) 22 μM , (C) 44 μM

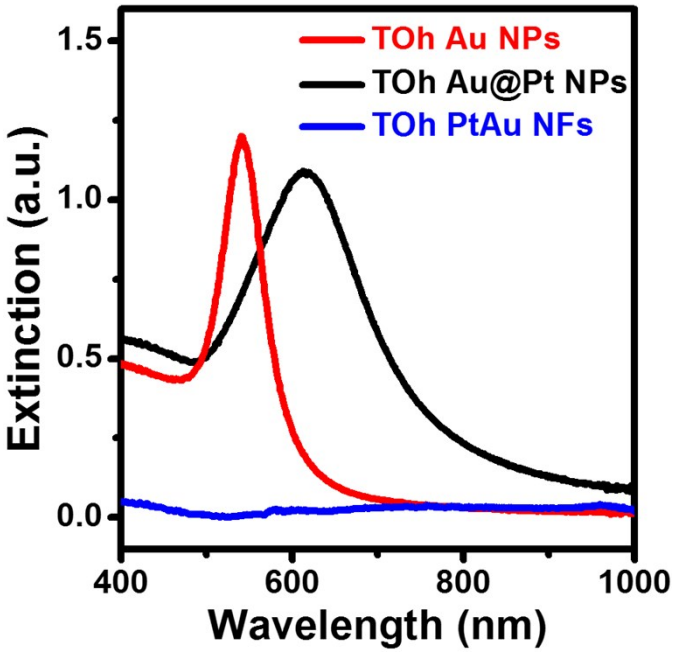


Figure S2 UV-Vis spectra of TOh Au NPs (red trace), TOh Au@Pt NPs (black trace), TOh PtAu NFs (blue trace).

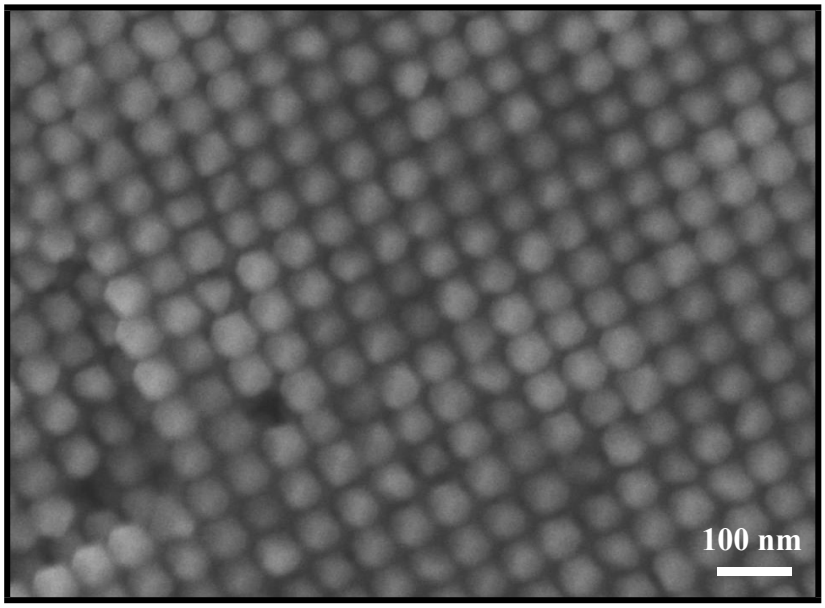


Figure S3 SEM image of self-assembled ordered TOh Au NPs with uniform shape and size.

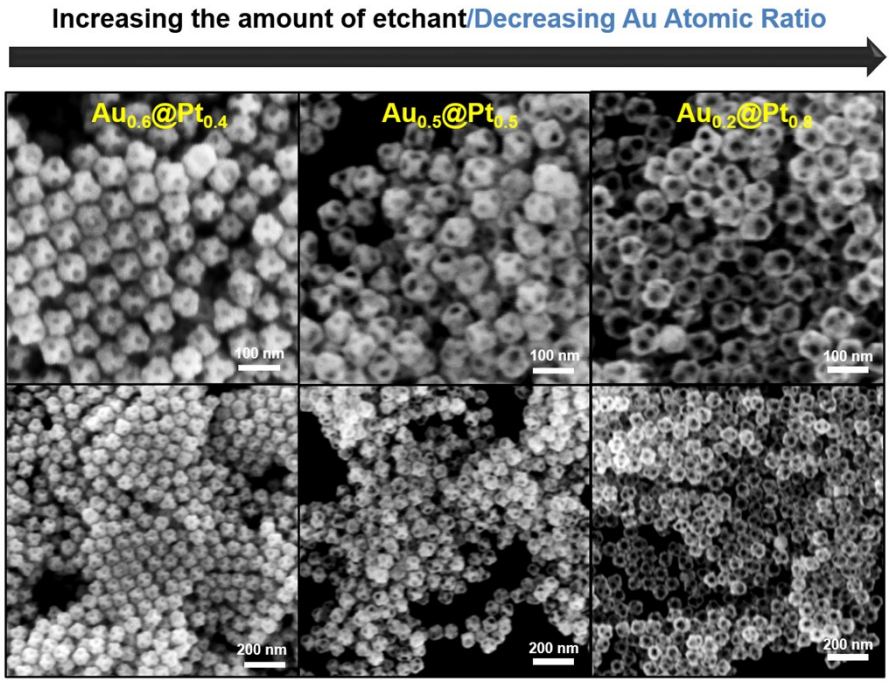
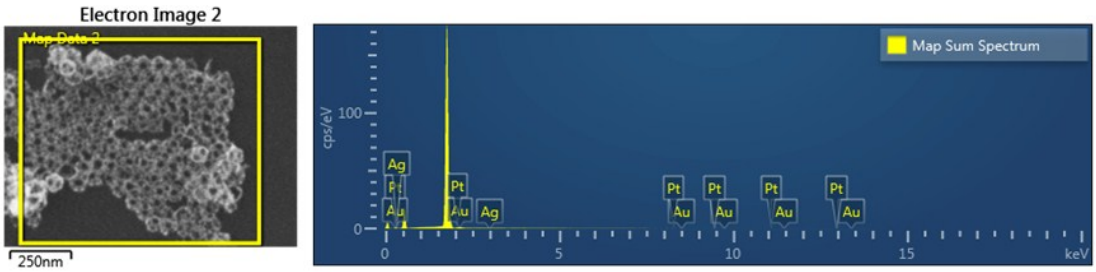


Figure S4 Controlling atomic ratio of PtAu NFs by changing etchant concentration. Bottom figure of each column shows low magnification and top figure shows high magnification of PtAu NFs.



Element	Line Type	Apparent Concentration	k Ratio	Wt%	Wt% Sigma	Atomic %	Standard Label	Factory Standard	Standard Calibration Date
Ag	L series	0.00	0.00003	0.39	3.53	0.70	Ag	Yes	
Pt	M series	0.77	0.00771	65.55	3.07	65.55	Pt	Yes	
Au	M series	0.36	0.00363	34.07	2.35	33.75	Au	Yes	
Total:				100.00		100.00			

Figure S5 EDS mapping for compositional analysis of a typical TOh PtAu NFs

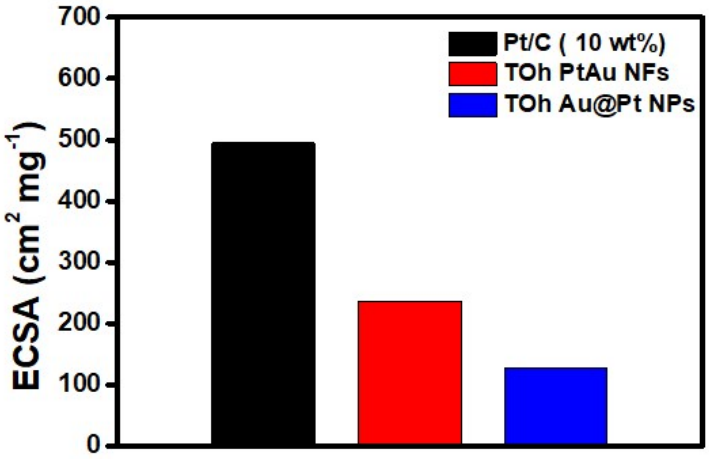


Figure S6 ECSA of Pt/C, TOh Au@Pt solid NPs and TOh PtAu NFs.

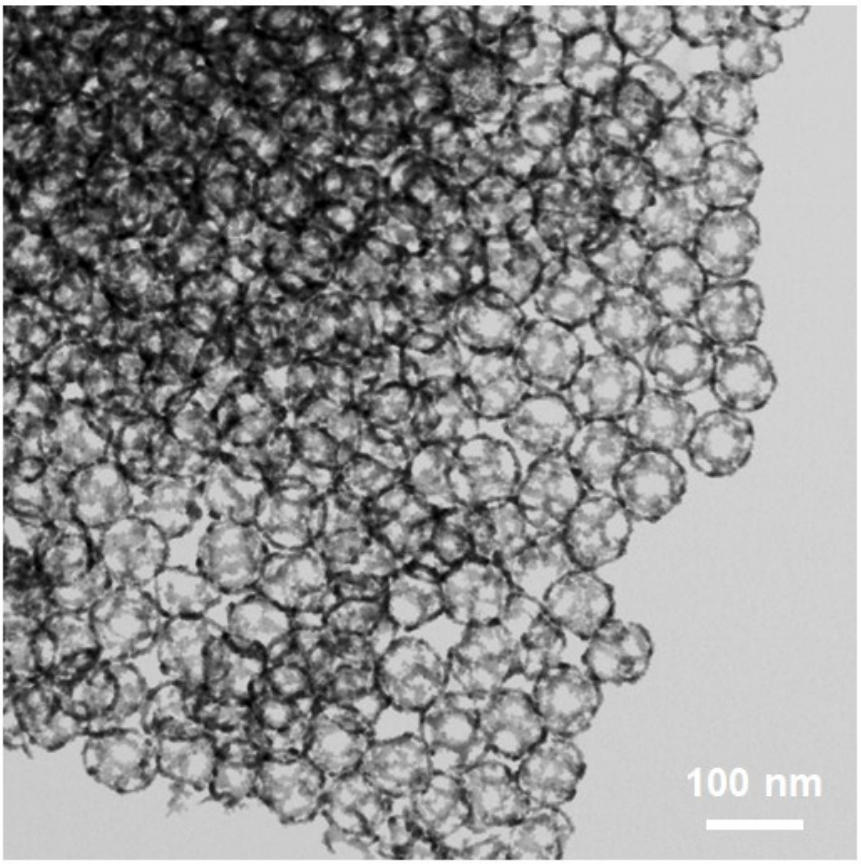


Figure S7 TEM image of PtAu NFs after 800 cycles in 0.1 M H_2SO_4

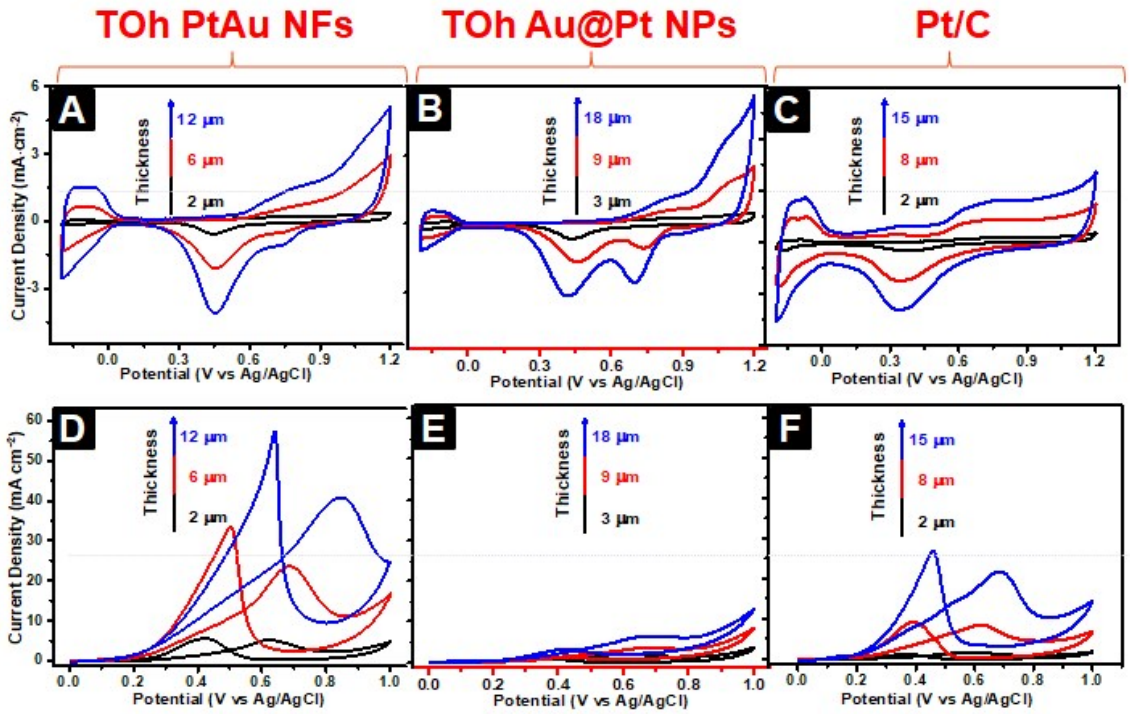


Figure S8 Catalytic performance of TOh NFs (A,D), TOh Au@Pt NPs (B,E) and Pt/C (C,F) with different film thicknesses as-shown in Figure S8. Cyclic voltammogram was carried out using in 0.1 M H_2SO_4 (A,B and C), MOR using 1 M Methanol in 0.1 M H_2SO_4 (D,E and F), respectively.

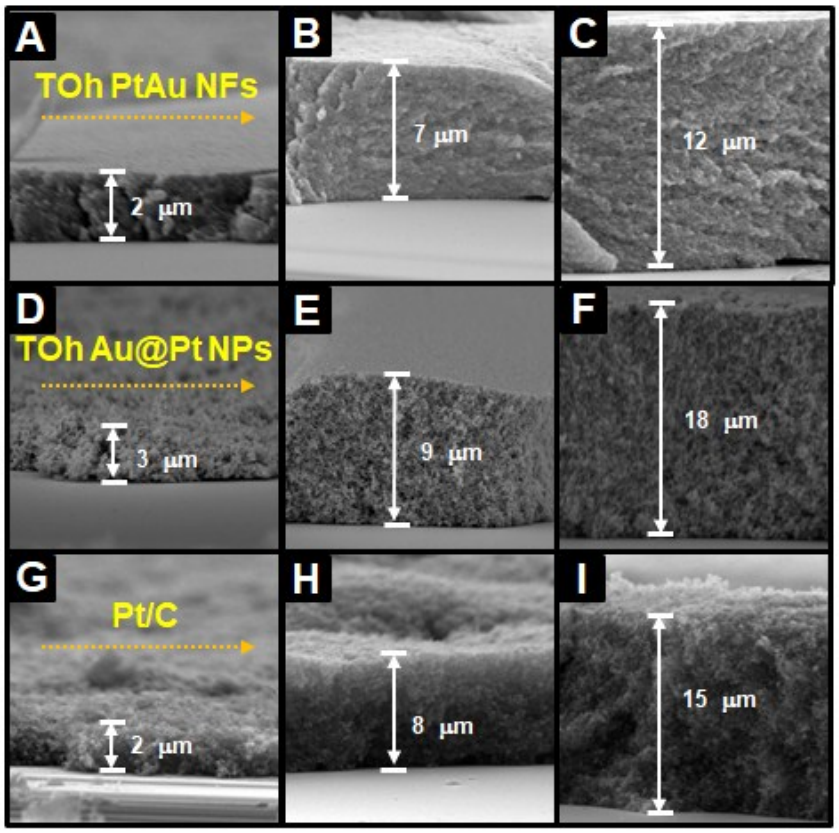


Figure S9 SEM images of TOh PtAu NFs (A-C), TOh Au@Pt NPs (D-F), and Pt/C (G-I) with different thicknesses.