Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Supporting Information

Platinum-Palladium Alloy Nanotetrahedra with Tuneable Lattice-Strain for Enhanced Intrinsic Activity

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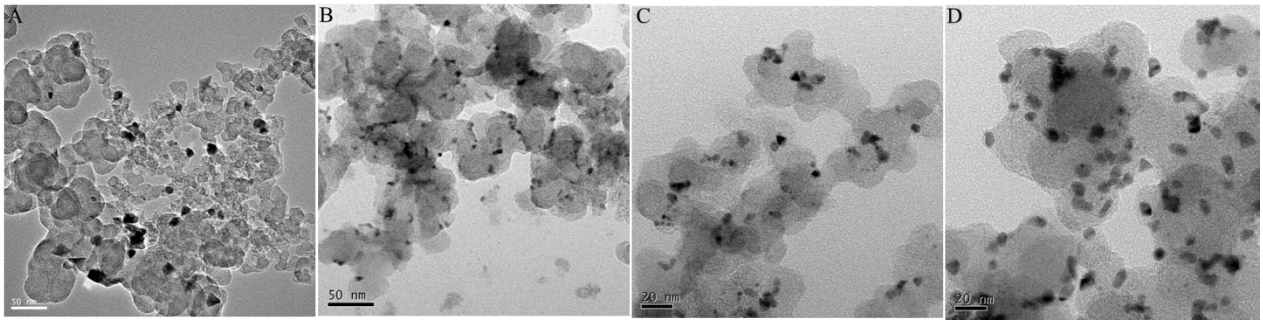


Fig. S1 TEM images of the nanotetrahedra samples ((A) $Pt_{16}Pd_{84}$/C, (B) $Pt_{35}Pd_{65}$/C, (C) $Pt_{83}Pd_{17}$/C and (D) Pt NPs/C).

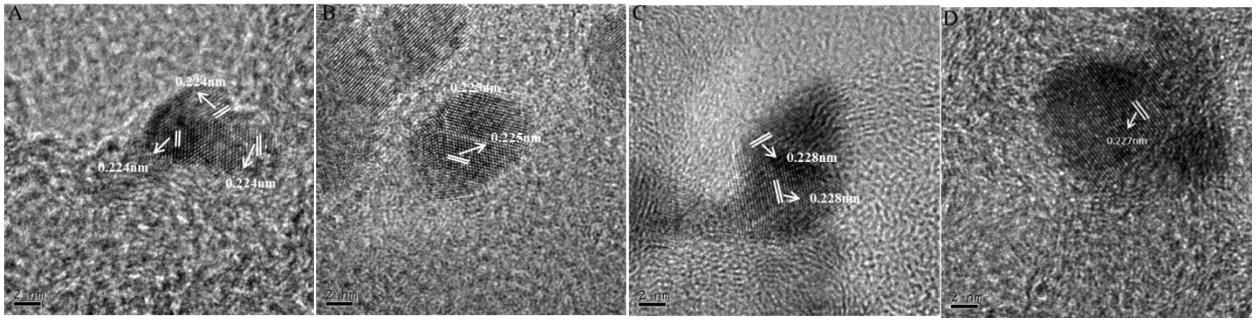


Fig. S2 HR-TEM images of the nanotetrahedra samples ((A) $Pt_{16}Pd_{84}$/C, (B) $Pt_{35}Pd_{65}$/C, (C) $Pt_{83}Pd_{17}$/C and (D) Pt NPs/C).

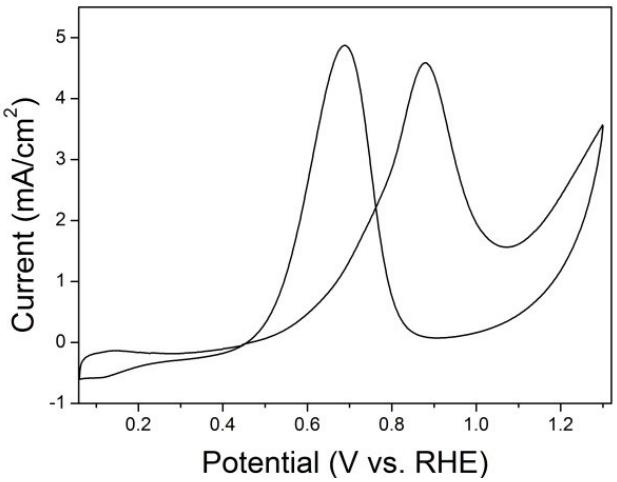


Fig. S3 CV curve of commercial Pt/C in 0.1 M $HClO_4$ + 0.5 M CH_3OH solution purged with N_2 at a scan rate of 50 mV s^{-1}

Table S1 Comparison of MOR activities of various catalysts

Catalyst	Electrolyte	Mass Activity (A/mg_{Pt}^{-1})	Specific Activity(mA/cm^2)	Reference
$Pt_{75}Pd_{25}$/rGO-CNTs	0.5 M H_2SO_4+1 M CH_3OH	1.01	5.4	1
$Pt_{60}Pd_{40}$-GNP	0.5 M H_2SO_4+1 M CH_3OH	0.47	0.263	2
PtPdCu-TiN	0.5MH_2SO_4+0.5M CH_3OH	0.37	0.48	3
PtPd-TiN	0.5 M H_2SO_4+0.5 CH_3OH	0.2	0.27	4
Pt_3Pd_1-CeO_2/C	0.5 M $HClO_4$ +1 MCH_3OH	0.853	2.05	5
$Pt_{62}Pd_{38}$/C	0.1M $HClO_4$+0.5 MCH_3OH	**1.31**	**0.57**	**This work**

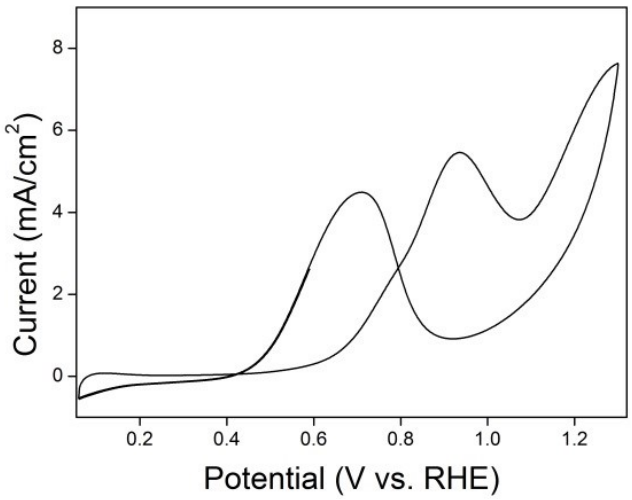


Fig. S4 CV curves of commercial Pt/C in 0.1 M $HClO_4$ + 0.5 M C_2H_5OH solution purged with N_2 at a scan rate of 50 mV s^{-1}

Table S2 Comparison of MOR activities of various catalysts

Catalyst	Electrolyte	Mass activity (A/mg_{Pt}^{-1})	Specific activity(mA/cm^2)	Reference
$Pt_{73}Pd_{27}$/C	0.5 M H_2SO_4+1 M C_2H_5OH	0.482	0.54	6
PtPd NPs	0.5 MH_2SO_4+0.5MC_2H_5OH	0.49	1.12	7
$Pt_{34}Pd_{33}Cu_{33}$	0.1M $HClO_4$+0.5MC_2H_5OH	0.19	1.13	8
Pt_1Pd_5 NC/RGO	0.5 M H_2SO_4+0.5MC_2H_5OH	1.08	2.31	9
Pt−Pd@TDI/rGO	0.1MHClO4 +0.5MC2H5OH	1.5	1.20	10
$Pt_{62}Pd_{38}$/C	0.1M $HClO_4$+0.5MC_2H_5OH	**1.2**	**0.87**	**This work**

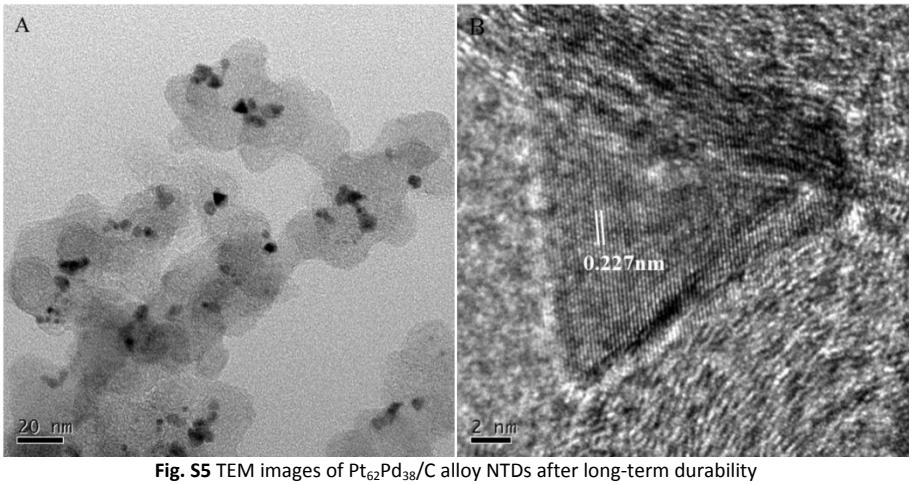
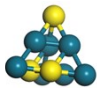


Fig. S5 TEM images of $Pt_{62}Pd_{38}$/C alloy NTDs after long-term durability

Table S3. Structure, binding energy ($E_{binding}$) and d-band center for Pt_nPd_{10-n} clusters

	Cluster	$E_{binding}$ (eV)	d-band center (eV)
Pt_{10}		1.461	-1.125
Pt_8Pd_2		1.464	-1.048
Pt_6Pd_4		1.466	-0.856
Pt_3Pd_7		1.465	-0.801
Pt_1Pd_9		1.463	-0.365
Pd_{10}		1.462	-0.253

Reference

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