Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Electronic Supplementary Information

CeO_2-Modified α-MoO_3 Nanorods as a Synergistic Support for Pt Nanoparticles with Enhanced CO_{ads} Tolerance during Methanol Oxidation

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Table S1. Binding energies and surface compositions from deconvolution of XPS spectra for Pt 4f in the core level region of $Pt/Ce_{0.2}Mo_{0.8}O_{3-\delta}$, Pt/MoO_3 and Pt/C catalysts.

	Pt (0)		Pt (II)		Pt (IV)	
	Binding energy (eV)	Relative ratio (%)	Binding energy (eV)	Relative ratio (%)	Binding energy (eV)	Relative ratio (%)
$Pt/Ce_{0.2}Mo_{0.8}O_{3-\delta}$	71.9	63.6	73.3	15.7	75.1	20.7
	75.3		76.7		78.5	
Pt/MoO_3	71.9	59.6	73.1	20.7	74.9	19.7
	75.2		76.4		78.3	
Pt/C	71.5	52.7	72.4	18.2	74.6	29.1
	74.9		75.7		77.9	

Table S2. Binding energies and surface compositions from deconvolution of XPS spectra for Ce 3d and Mo 3d at the core level region of catalysts.

Sample	Ce 3d			Mo 3d		
	Species	Binding energy (eV)	Relative ratio (%)	Species	Binding energy (eV)	Relative ratio (%)
$Pt/Ce_{0.2}Mo_{0.8}O_{3-\delta}$	Ce (IV)	882.4	57.7	Mo (VI)	233.0	81.7
	Ce (IV)	898.7		Mo (VI)	236.1	
	Ce (IV)	900.7		Mo (V)	231.5	18.3
	Ce (IV)	917.0		Mo (V)	234.6	
	Ce (III)	886.1	42.3			
Pt/MoO_3	Ce (III)	904.4		Mo (VI) Mo (VI) Mo (V) Mo (V)	232.8 235.9 231.4 234.6	85.7 14.3

Table S3. Electrochemical characterizations for $Pt/Ce_{0.2}Mo_{0.8}O_{3-\delta}$, Pt/MoO_3, and commercial Pt/C catalysts.

Sample	Onset potentials[a] (mV)	Peak potentials[a] (mV)	Onset potentials[b] (mV)	Mass activity(mA mg_{Pt}^{-1})[b] (mV)
$Pt/Ce_{0.2}Mo_{0.8}O_{3-\delta}$	520	817	403	585
Pt/MoO_3	580	824	478	442
Pt/C	735	869	510	353

[a] Obtained from Fig. 8; [b] Obtained from Fig. 9.

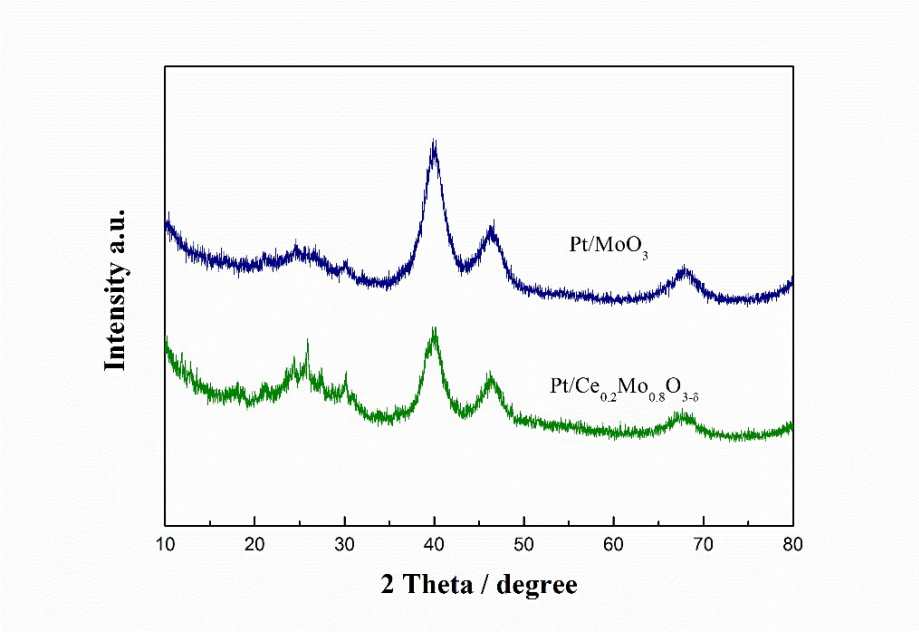

Fig. S1 XRD patterns of $Pt/Ce_{0.2}Mo_{0.8}O_{3-\delta}$ and Pt/MoO_3 catalysts.

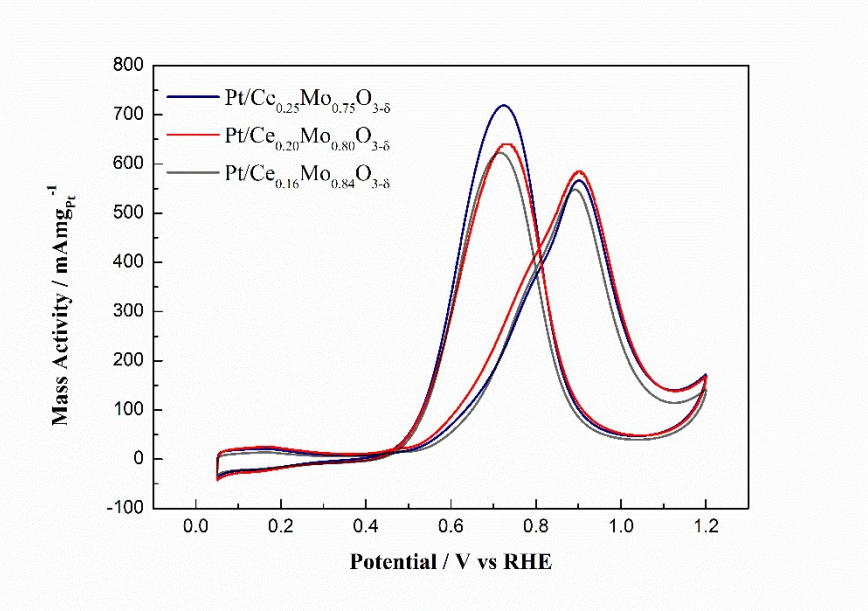

Fig. S2 CV curves of Pt supported on Ce-doped MoO_3 with different ratios of Ce:Mo in 0.5 mol L^{-1} H_2SO_4 + 0.5 mol L^{-1} CH_3OH.

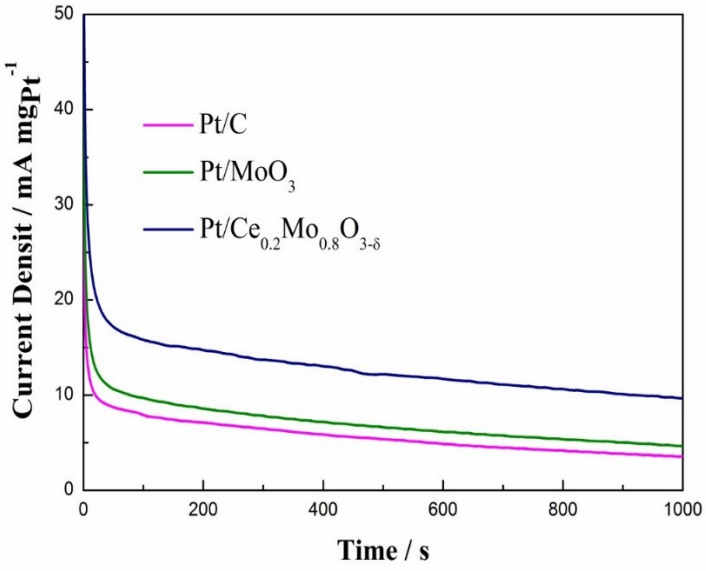

Fig. S3 CA curves of $Pt/Ce_{0.2}Mo_{0.8}O_{3-\delta}$, Pt/MoO_3 and commercial Pt/C catalysts at 0.6 V for 1000 s in 0.5 mol L^{-1} H_2SO_4 + 0.5 mol L^{-1} CH_3OH.

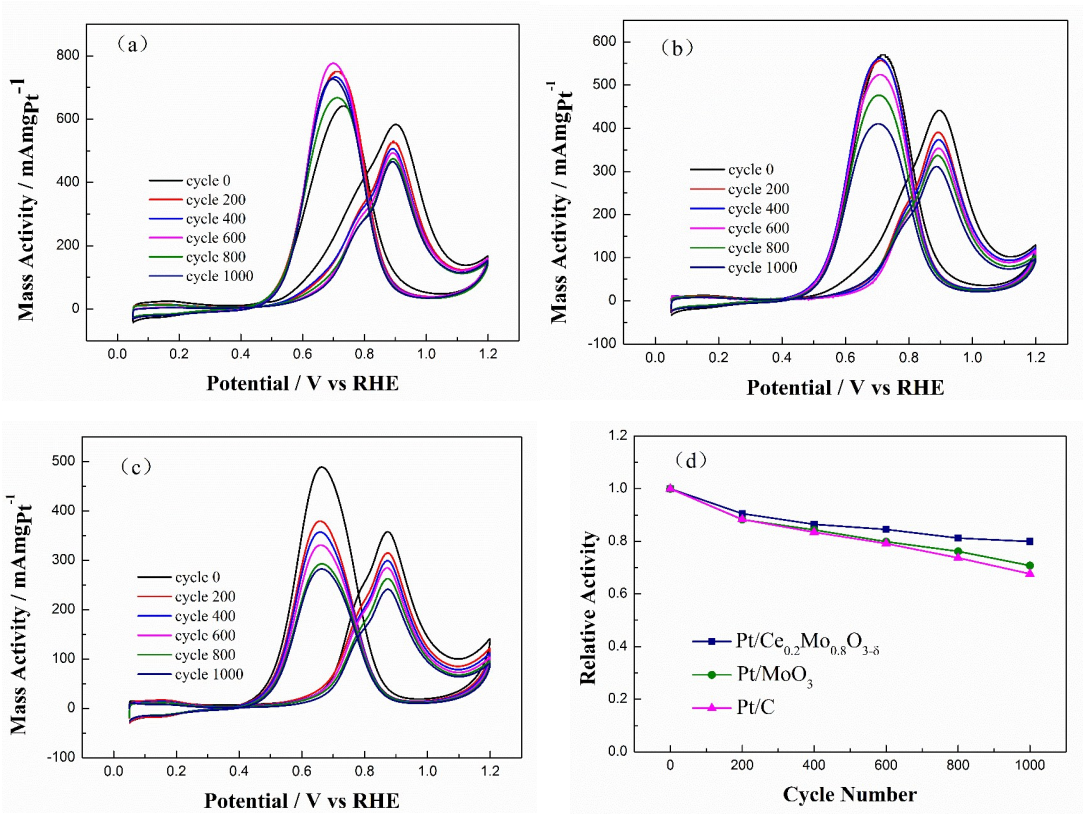

Fig. S4 Continued voltammetry cycles of (a) $Pt/Ce_{0.2}Mo_{0.8}O_{3-\delta}$, (b) Pt/MoO_3 and (c) commercial Pt/C catalysts in 0.5 mol L^{-1} H_2SO_4 at 25 °C. (d) Relative activity of the three catalysts based on cycle number during stability testing.

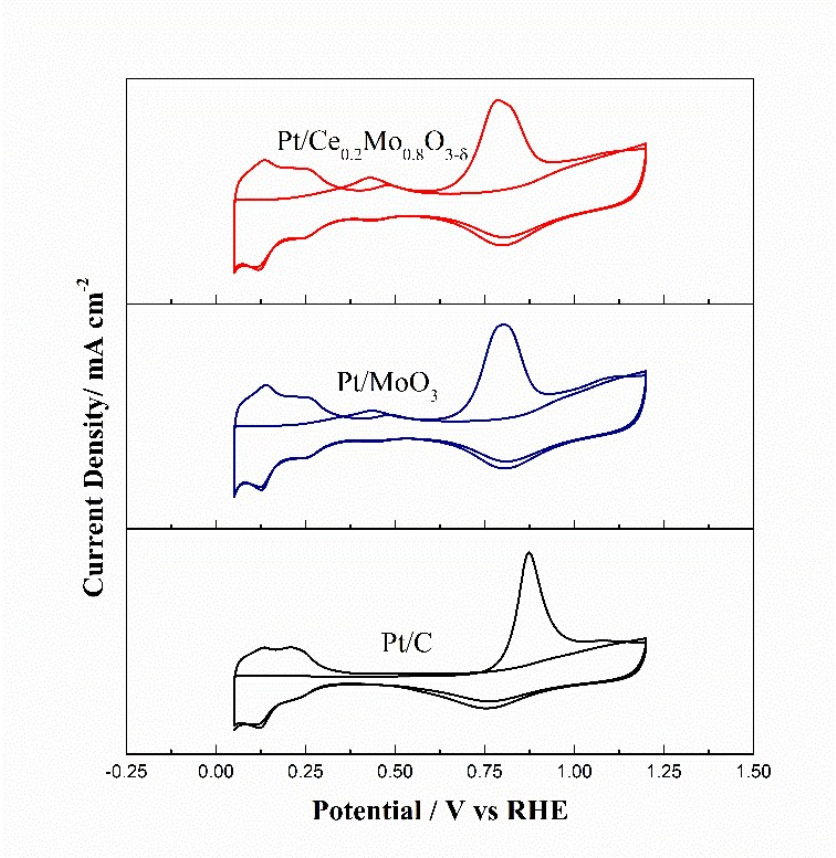

Fig. S5 CO stripping voltammogram for (a) commercial Pt/C, (b) Pt/MoO_3 and (c) $Pt/Ce_{0.2}Mo_{0.8}O_{3-\delta}$ catalysts after accelerated aging tests.

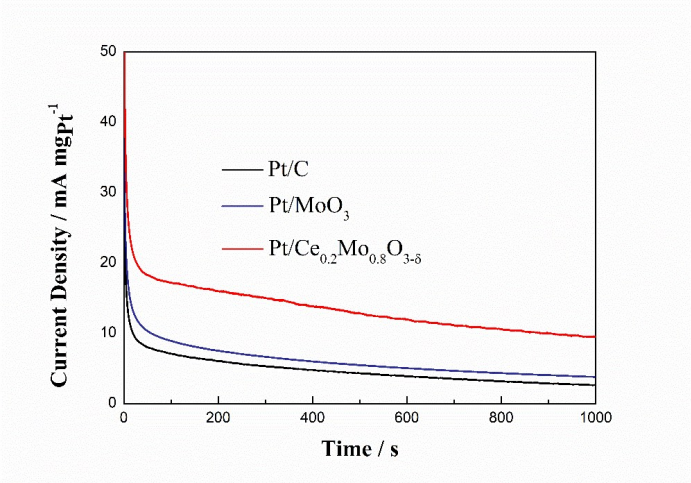

Fig. S6 CA curves of $Pt/Ce_{0.2}Mo_{0.8}O_{3-\delta}$, Pt/MoO_3 and commercial Pt/C catalysts at 0.6 V for 1000 s after accelerated aging tests in 0.5 mol L^{-1} H_2SO_4 + 0.5 mol L^{-1} CH_3OH.

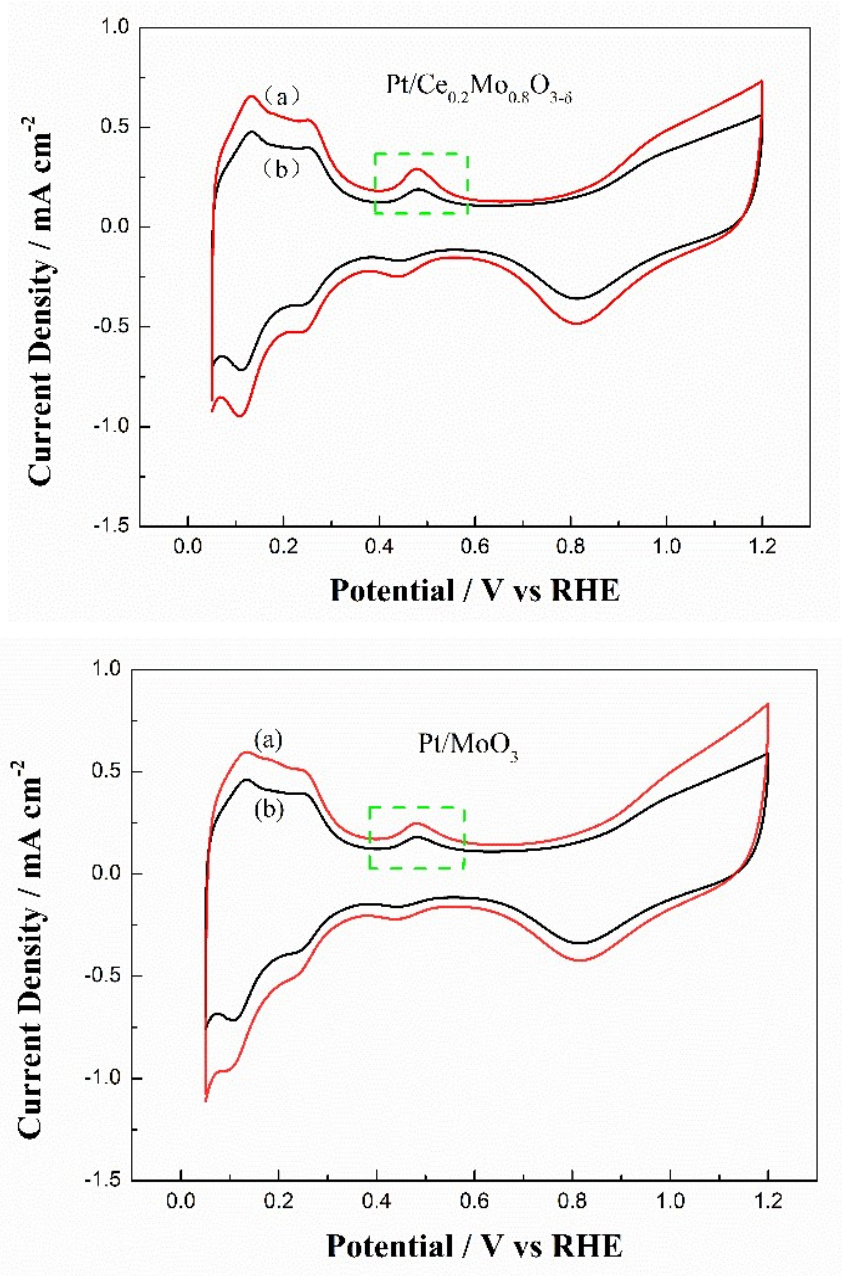

Fig. S7. CV comparisons of $Pt/Ce_{0.2}Mo_{0.8}O_{3-\delta}$ and Pt/MoO_3 catalysts in 0.5 mol L^{-1} H_2SO_4 solution before (a) and after ASTs (b).