Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Intermetallic Pd_3Pb Nanowire Networks Boost Ethanol Oxidation and Oxygen Reduction Reaction with Significantly Improved Methanol Tolerance

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Supporting Figures

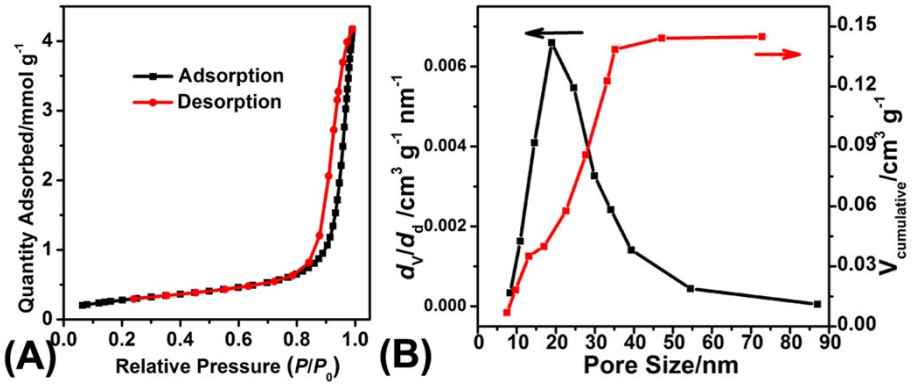

Figure S1. (A) Nitrogen physisorption isotherm, and (B) pore size distributions (black curve) and cumulative pore volumes ($V_{cumulative}$, red curve) of as-fabricated IM-Pd_3Pb NNs.

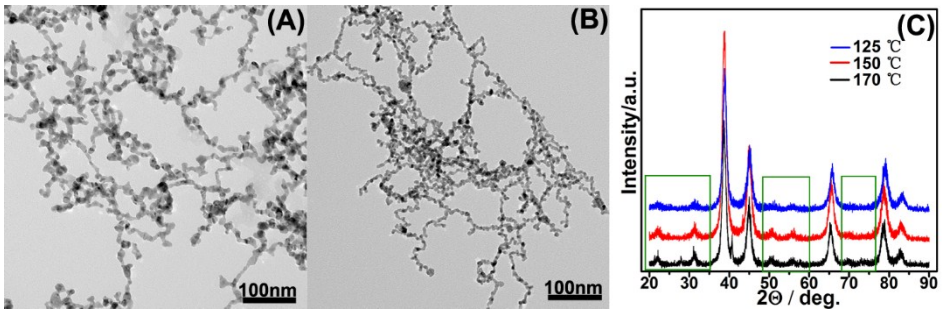

Figure S2. TEM images and size distribution (insets) of Pd_3Pb NNs synthesized at 125 °C (A) and 150 °C (B), respectively. XRD pattern of Pd_3Pb NNs obtained at 125 °C, 150 °C and 170 °C, respectively.

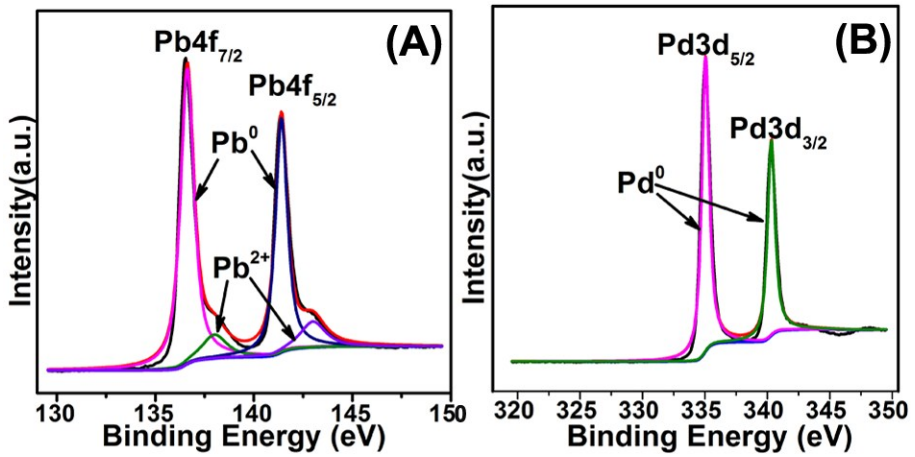

Figure S3. XPS of the (A) Pb 4f and (B) Pd 3d peaks of IM-Pd_3Pb NNs.

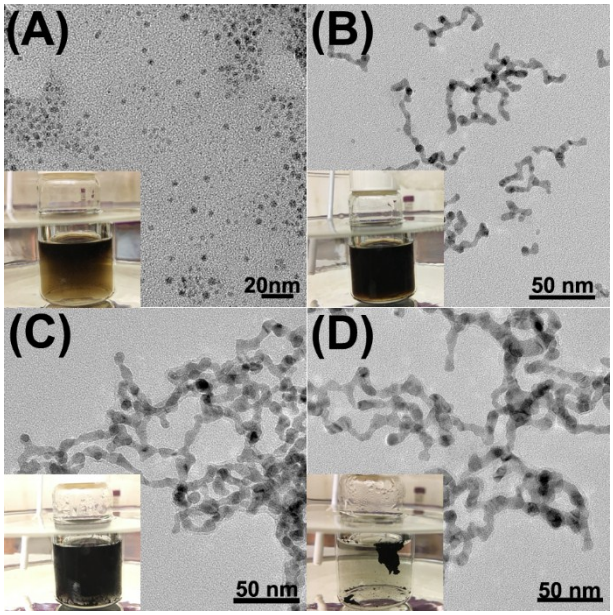

Figure S4. Time-dependent TEM images of the IM-Pd_3Pb NNs growth precedures tracted at 2 min (A), 5 min (B), 15 mins (C), and 30 min (D) after reaction begins.

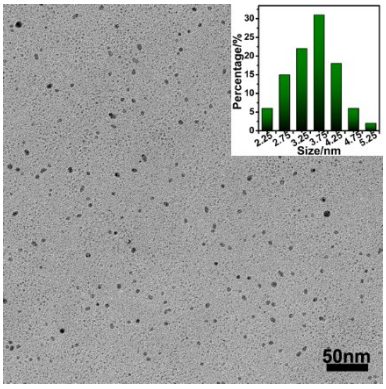

Figure S5. TEM image and size distribution (inset) of as-synthesized Pd NCs under the same condition with IM-Pd_3Pb NNs only except the absence of $Pb(acac)_2$.

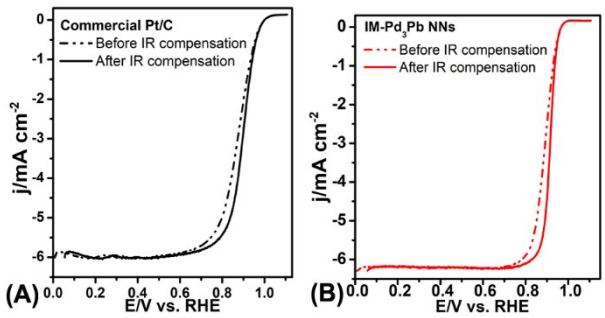

Figure S6. LSV of commercial Pt/C (A) and IM-Pd3Pb NNs (B) before and after 100 % IR compensation.

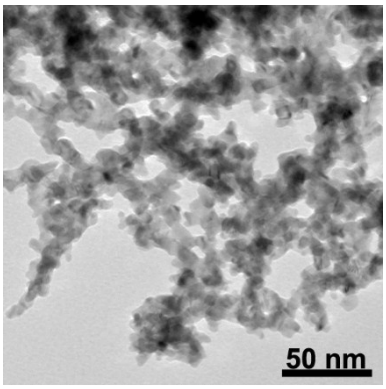

Figure S7. TEM image of as-synthesized Pd NSs.

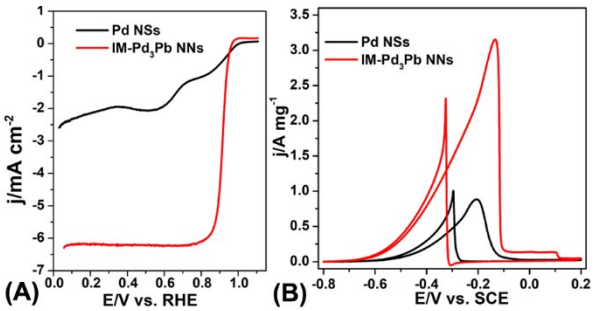

Figure S8. (A) LSV curves of Pd NSs and IM-Pd_3Pb NNs obtained in oxygen saturated 0.1 M KOH aqueous solution. (B) CV curves of Pd NSs and IM-Pd_3Pb NNs in 1 M KOH aqueous solution containing 1 M ethanol.

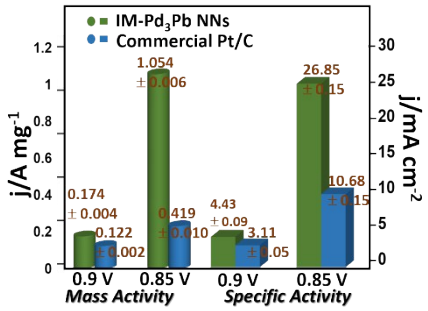

Figure S9. MA and SA of commercial Pt/C and IM-Pd3Pb NNs at 0.85 V and 0.9 V with error correction, respectively.

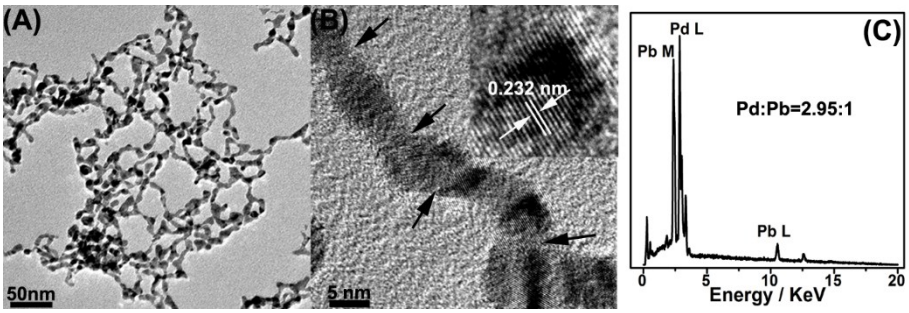

Figure S10. TEM image (A), HRTEM image (B) and EDS (C) of IM-Pd_3Pb NNs after ADT test.

Supporting Tables

Table S1. The atomic ratios of Pd/Pb under different amount of Pd and Pb precursors.

Na_2PdCl_4	$Pb(acac)_2$	Pd/Pb(precursor)	Pd/Pb(EDS)
7.1 mg	19.5 mg	1/2	2.95
7.1 mg	16.2 mg	1/6	3.05
7.1 mg	13.0 mg	3/4	3.30

Table S2. The reaction temperature and time for formation of intermetallic phases from previous reported works.

IM NCs	Solvent	temperature	time	reference
Pd_3Pb NNs	EG	170 °C	1 h	our work
Pd_3Pb NPs	annealing	600 °C	24 h	1
Pd_3Pb NPs	TEG	180 °C	15 min	2
Pt_3Co	OAm	160 °C	8 h	3
Pd_2Sn	OAm, MAHC	300 °C	3 h	4
PtBi	OAm	200 °C	1.5 h	5
PtPb/Pt	OAm+ODE	160 °C	5.5 h	6
Pt_3Zn	DMF	180 °C	9 h	7
$PtCu_3$	OAm	170 °C	24 h	8

References

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