

Pd₁₁Ni₁₁Pt₂ nanoparticles with three-phase surface enrichment for facilitating ethanol and ethylene glycol electrooxidation

Junming Zhang ^{a,*}, Yao Chen ^{a,1}, Xiaojie Zhang ^{a,1}, Xianchen Xu ^a, Xiongfeng Ma ^a, Youjun Fan ^{b,*}, Chaoyue Zhao ^c, He Xiao ^a, Man Zhao ^a, Tianjun Hu ^a, Baoliang Lv ^a, Ergui Luo ^a, Jianfeng Jia ^{a,*}

^a *Key Laboratory of Magnetic Molecules and Magnetic Information Materials of Ministry of Education, School of Chemistry and Materials Science, Shanxi Normal University, Taiyuan 030032, China*

^b *Guangxi Key Laboratory of Low Carbon Energy Materials, School of Chemistry and Pharmaceutical Sciences, Guangxi Normal University, Guilin 541004, China*

^c *Dalian National Laboratory for Clean Energy (DNL), Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian 116023, China*

* Corresponding authors.

E-mail addresses: zhangjunming@sxnu.edu.cn (J. Zhang), youjunfan@mailbox.gxnu.edu.cn (Y. Fan), jiajf@dns.sxnu.edu.cn (J. Jia).

¹ These authors contributed equally to the work.

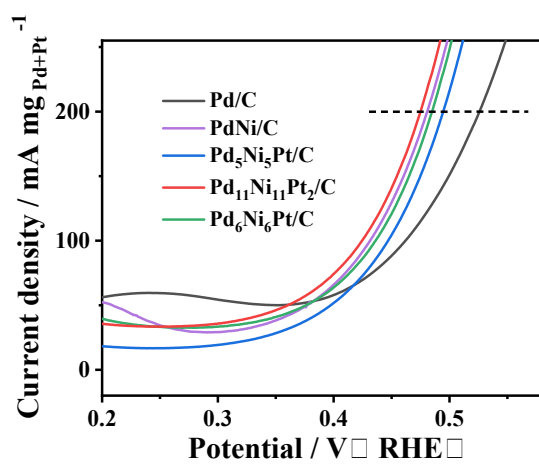


Figure S1. local magnification of the curves during the initial period of EOR in figure 5b.

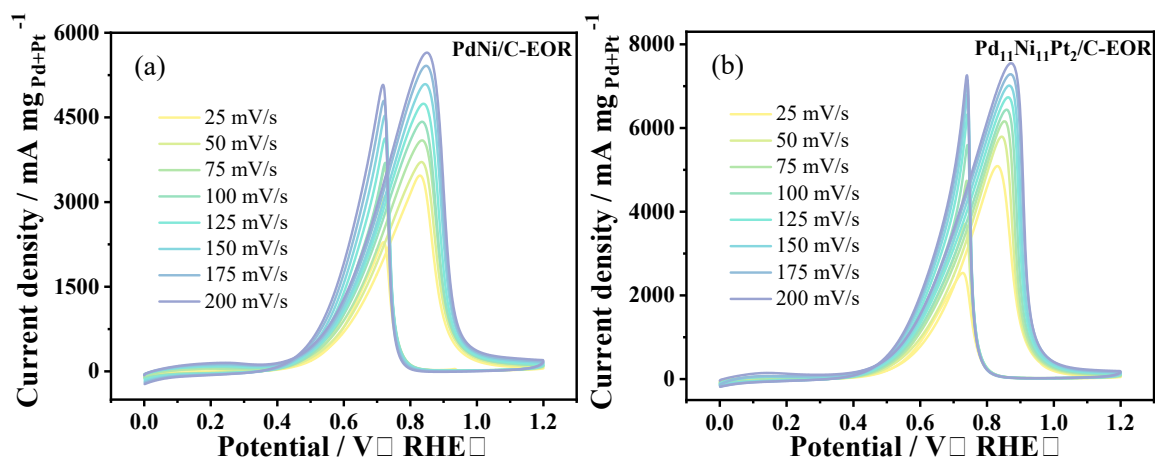


Figure S2. CV curves of EOR on PdNi/C and Pd₁₁Ni₁₁Pt₂/C catalysts at different scan rates (25~200 mV/s).

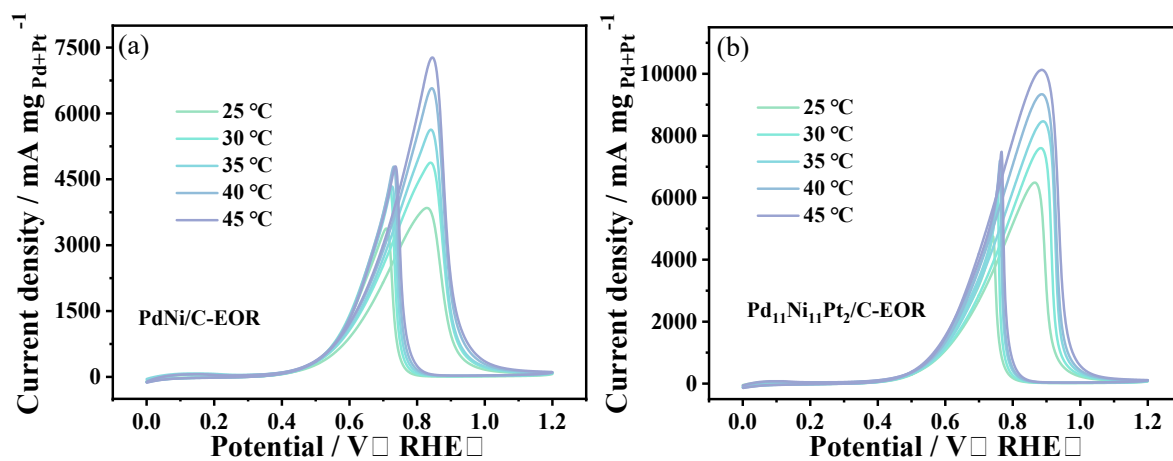


Figure S3. CV curves of EOR on PdNi/C (a) and Pd₁₁Ni₁₁Pt₂/C (b) catalysts at various temperatures recorded in 1.0 M ethanol + 1.0 M KOH solution.

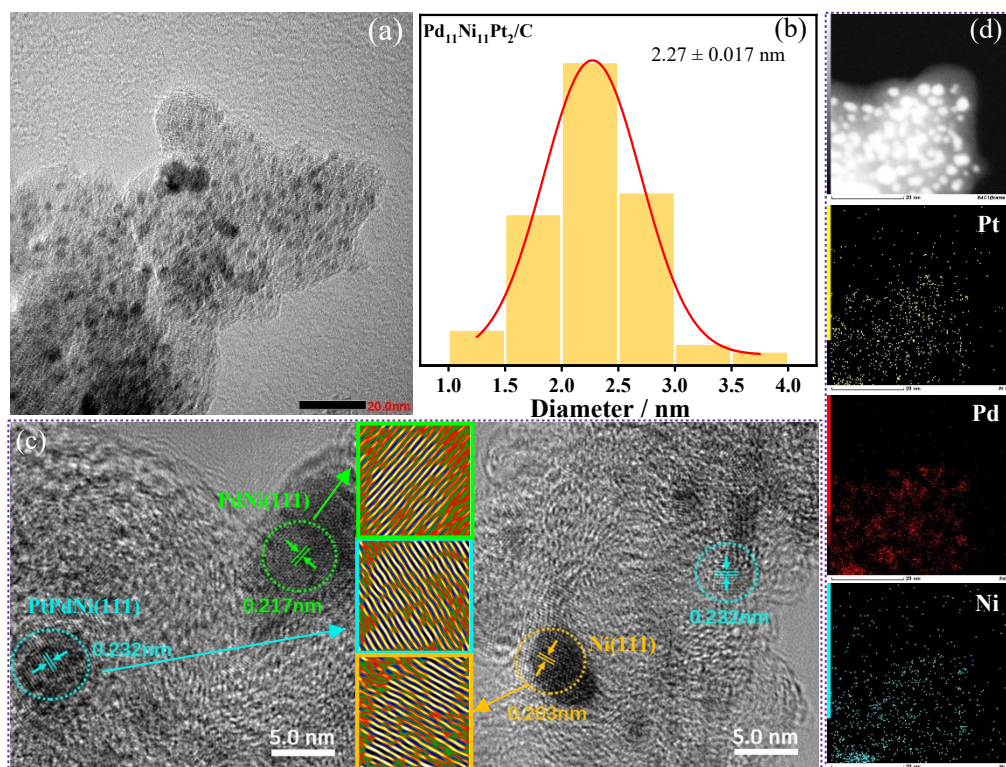


Figure S4. $\text{Pd}_{11}\text{Ni}_{11}\text{Pt}_2/\text{C}$ -P sample: (a) Representative TEM images. (b) The corresponding size distribution histogram. (c) High-resolution TEM image and lattice fringes in the crystalline area. (d) Elemental mapping of Pt, Pd, and Ni elements of the $\text{Pd}_{11}\text{Ni}_{11}\text{Pt}_2/\text{C}$ -P sample.

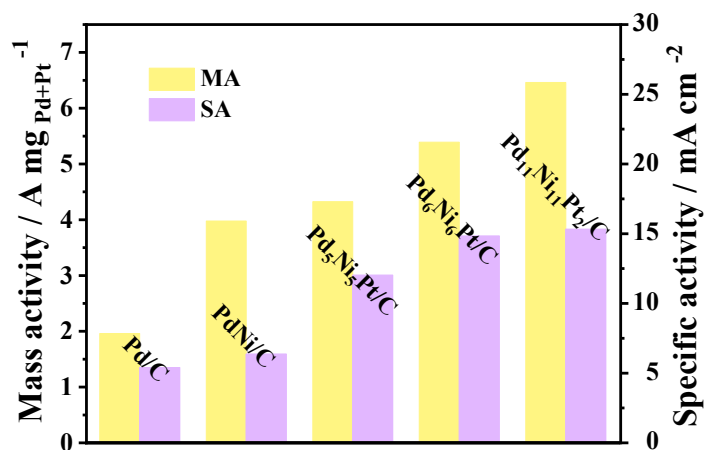


Figure S5. EOR electrocatalysis: Comparison of specific and mass activities of the five Pd-based catalysts.

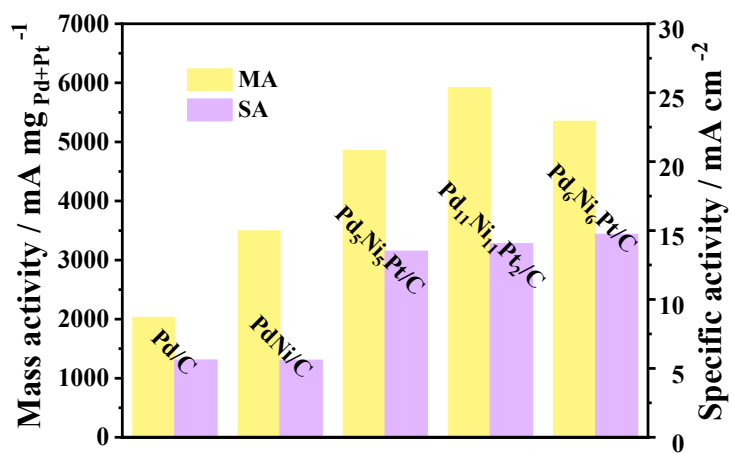


Figure S6. EGOR electrocatalysis: Histograms of specific and mass activities.

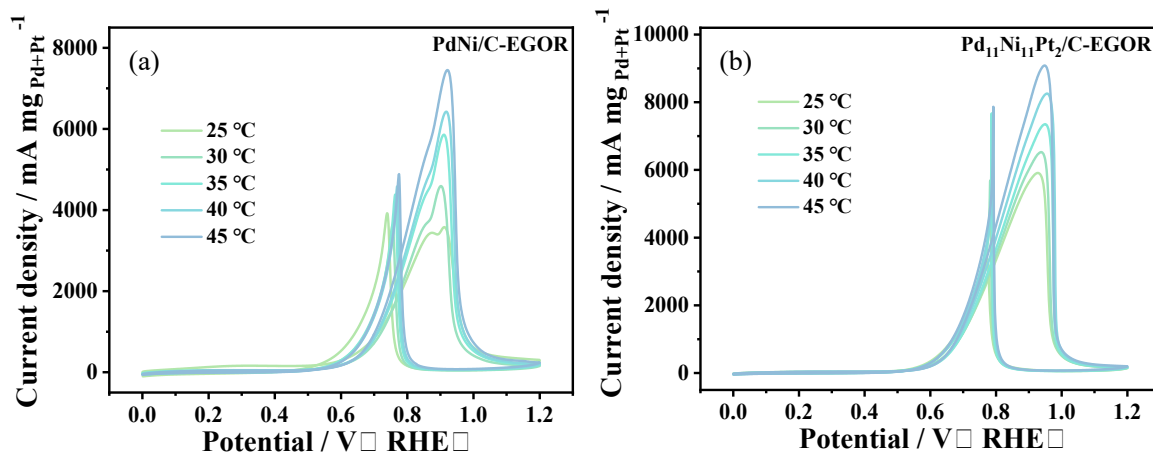


Figure S7. CV curves of EGOR on PdNi/C (a) and Pd₁₁Ni₁₁Pt₂/C (b) catalysts at various temperatures recorded in 1.0 M EG + 1.0 M KOH solution.

Table S1. Comparison the performance of the Pd₁₁Ni₁₁Pt₂/C catalyst with some catalysts reported recently for the EOR.

Sample	electrolyte solution	MA (mA mg _{Pd} ⁻¹)	SA (mA cm ⁻²)	Ref.
Pd ₁₁ Ni ₁₁ Pt ₂ /C	1.0 M KOH + 1.0 M ethanol	6461	15.32	This work
SAW-Pd MAs	1.0 M KOH + 1.0 M ethanol	5290	10.9	[1]
Pd ₂ Sn-s@Pt	1.0 M KOH + 1.0 M ethanol	4750	20.14	[2]
PdBi NR/C	1.0 M KOH + 1.0 M ethanol	3210	4.33	[3]
RhCu NDs/CB	0.1 M KOH + 1.0 M ethanol	472.4	0.47	[4]
m-PtPb NSs	1.0 M KOH + 1.0 M ethanol	1233.7	1.17	[5]
AgAu-40/CF	1.0 M KOH + 1.0 M ethanol	1834	/	[6]
Pd ₇₉ Au ₂₀ Pt ₉	1.0 M KOH + 1.0 M ethanol	4910	/	[7]
PdPtNi	1.0 M KOH + 1.0 M ethanol	6210	5.6	[8]
PdCuSn	1.0 M KOH + 1.0 M ethanol	6220	9.1	[9]
PdCuNi/C	1.0 M KOH + 1.0 M ethanol	3740	/	[10]
Pt ₇₀ Pd ₂₄ Ni ₆ /rGO	1.0 M NaOH + 0.5 M ethanol	3620	~75	[11]
PtPdNi/CMK-3	0.1 M NaOH + 1.0 M ethanol	302	/	[12]
PtPdNiCu	1.0 M KOH + 1.0 M ethanol	1019	.153.18	[13]

Table S2. Comparison the performance of the Pd₁₁Ni₁₁Pt₂/C catalyst with some catalysts reported recently for the EGOR.

Sample	electrolyte solution	MA (mA mg _{Pd} ⁻¹)	SA (mA cm ⁻²)	Ref.
Pd ₁₁ Ni ₁₁ Pt ₂	1.0 M KOH + 1.0 M EG	5922	14.04	This work
coral-like Pd network	1.0 M KOH + 0.5 M EG	1785	8.81	[14]
Pd ₆ Bi ₁ TNWs	1.0 M KOH + 1.0 M EG	3047	7.04	[15]
RhCu nanoboxes	1.0 M KOH + 1.0 M EG	775.1	1.54	[16]
Pd ₇ Ni ₃	1.0 M KOH + 1.0 M EG	2435.0	19.2	[17]
PtRh _{0.02} @Rh	0.1 M KOH + 0.5 M EG	1250	6	[18]
Pt ₅₆ Rh ₄₄	0.5 M KOH + 0.5 M EG	1498.9	4.05	[19]
Pd-PdSe HNSs	1.0 M KOH + 1.0 M EG	8600	15.7	[20]
fcc-2H-fcc Au@Pd	0.5 M KOH + 0.5 M EG	5400	10.9	[21]
Pd/CoTe-C	1.0 M KOH + 1.0 M EG	3917.3	/	[22]
Pt ₇₀ Pd ₂₄ Ni ₆ /rGO	1.0 M NaOH + 0.5 M EG	7750	~130	[11]
Pt ₃₂ Pd ₄₈ Ni ₂₀	0.5 M KOH + 0.5 M EG	9770	/	[23]
PtRuPd	0.5 M KOH + 0.5 M EG	1368	116.11	[24]

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