Supplementary Materials for

Boosting Ethanol Electrooxidation at RhBi Alloy and Bi_2O_3 Composite Surfaces in Alkaline Media

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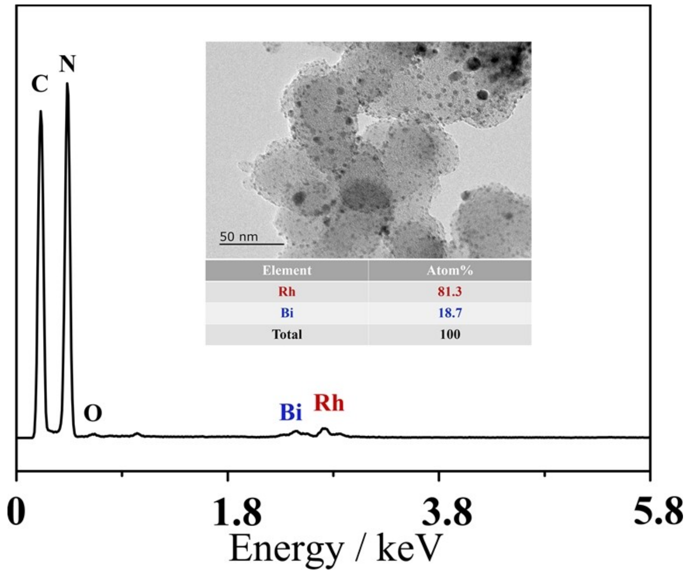

Figure S1. The typical energy-dispersive X-ray spectral (EDX) profile of RhBi-Bi_2O_3 catalysts which collected on randomly selected area during the corresponding transmission electron microscopy (TEM) characterization (the inset).

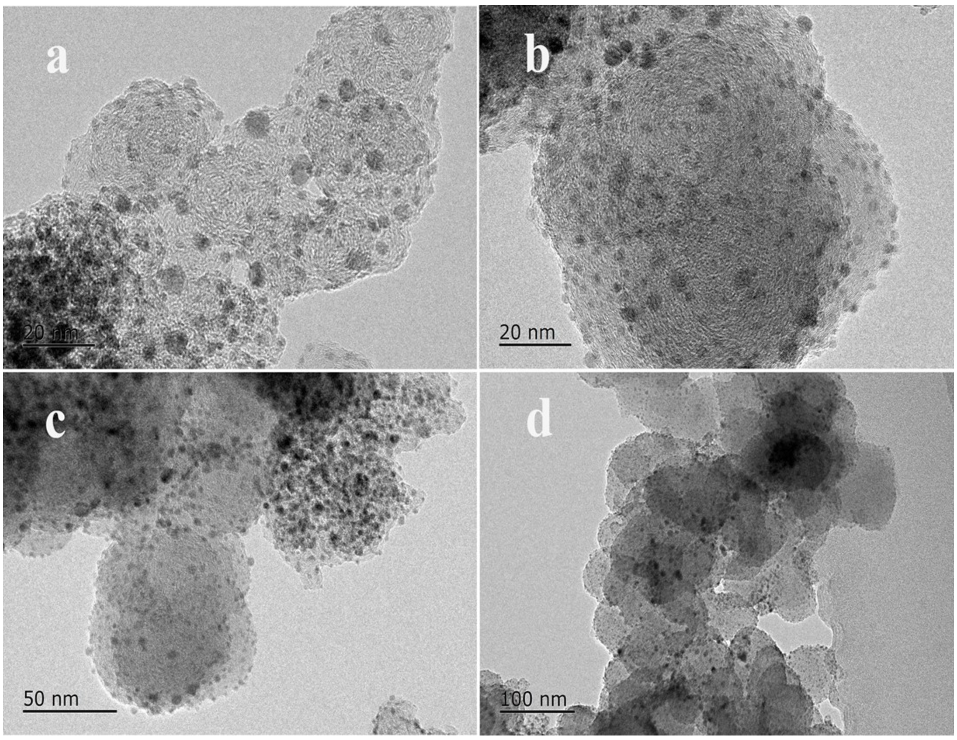

Figure S2. Typical HR-TEM images of the RhBi-Bi_2O_3 sample at different scales.

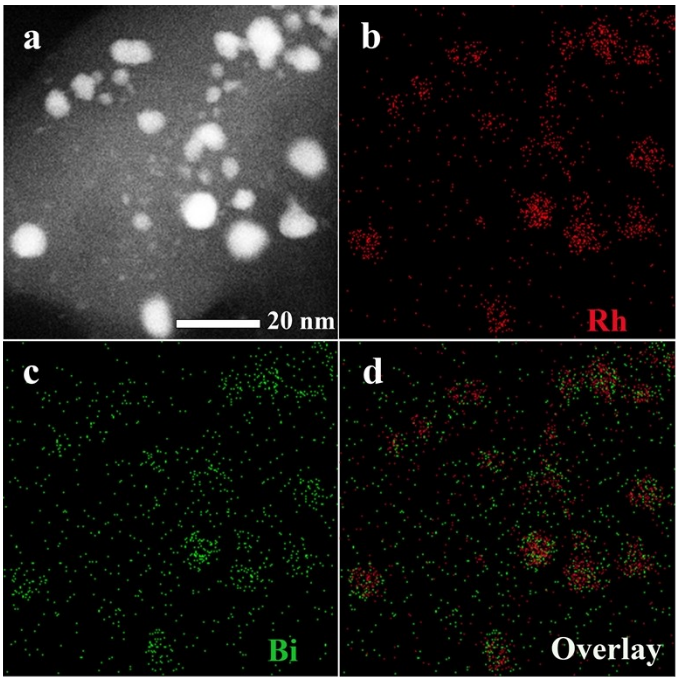

Figure S3. (a) High-angle annular dark field (HAADF) STEM image and (b-d) elemental mapping analysis of Rh and Bi elements for the RhBi-Bi_2O_3 sample.

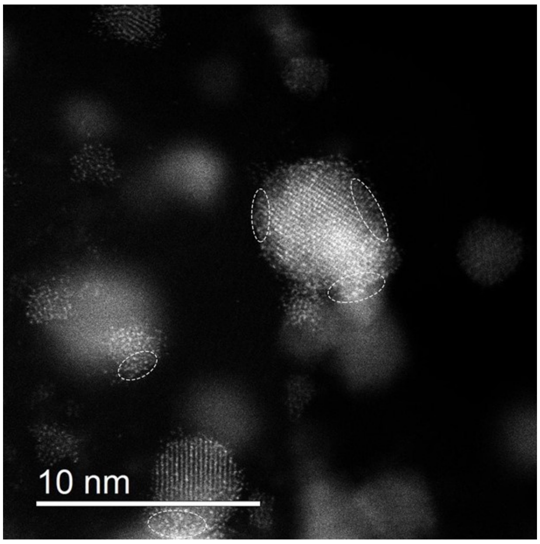

Figure S4. Typical High-resolution HAADF-STEM image of the as-prepared RhBi-Bi_2O_3 sample, and the flocculent structures are labeled by the white cycles.

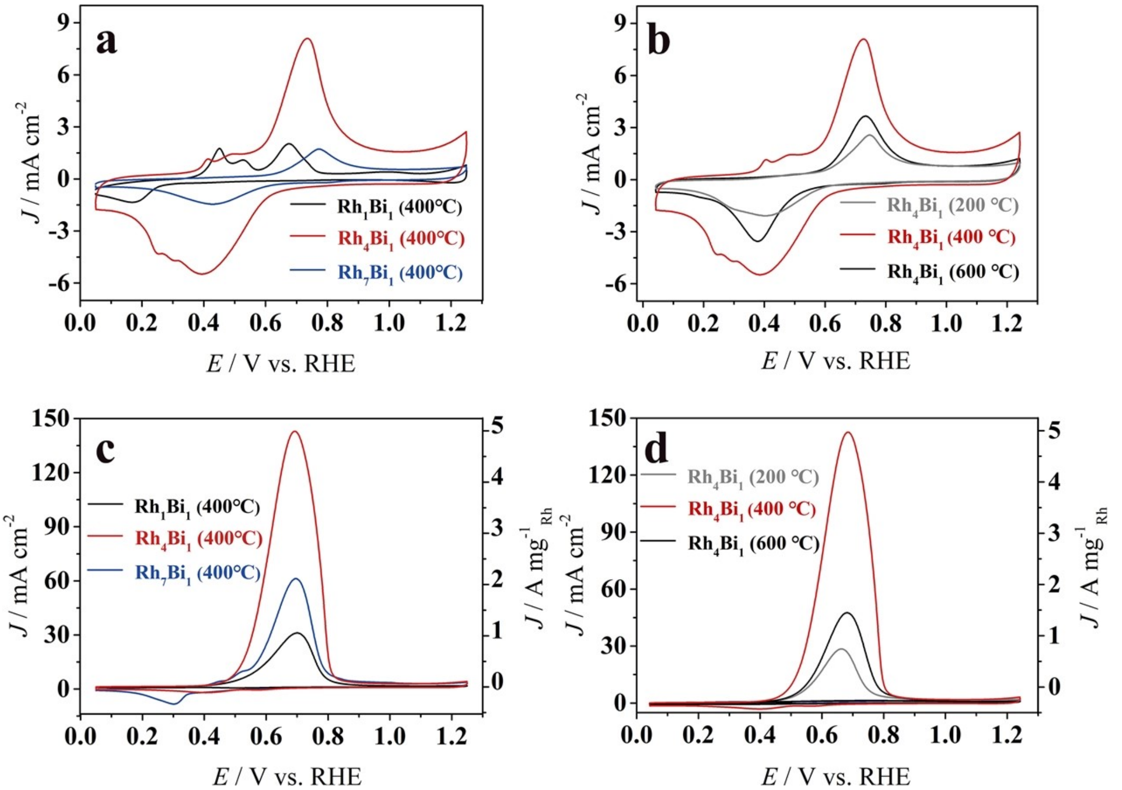

Figure S5. Cyclic voltammograms (CVs) collected on the Rh-based catalysts surfaces with different (a) Rh-to-Bi molar ratio and (b) annealing temperatures in 1 M NaOH and the corresponding CVs collected in 1 M NaOH+1 M C_2H_5OH solution (c-d) at the rate of 50 mV·s^{-1}.

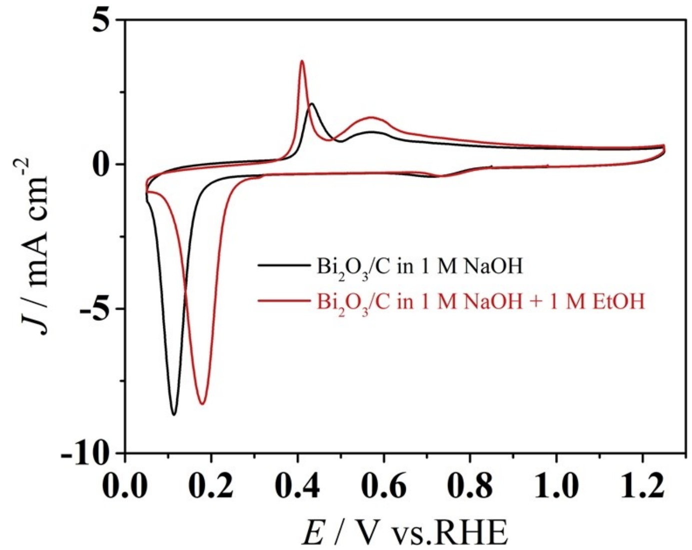

Figure S6. Cyclic voltammograms collected on the Bi_2O_3/C catalysts surfaces in 1 M NaOH and in 1 M NaOH + 1 M CH_3CH_2OH at the rate of 50 mV·s^{-1}.

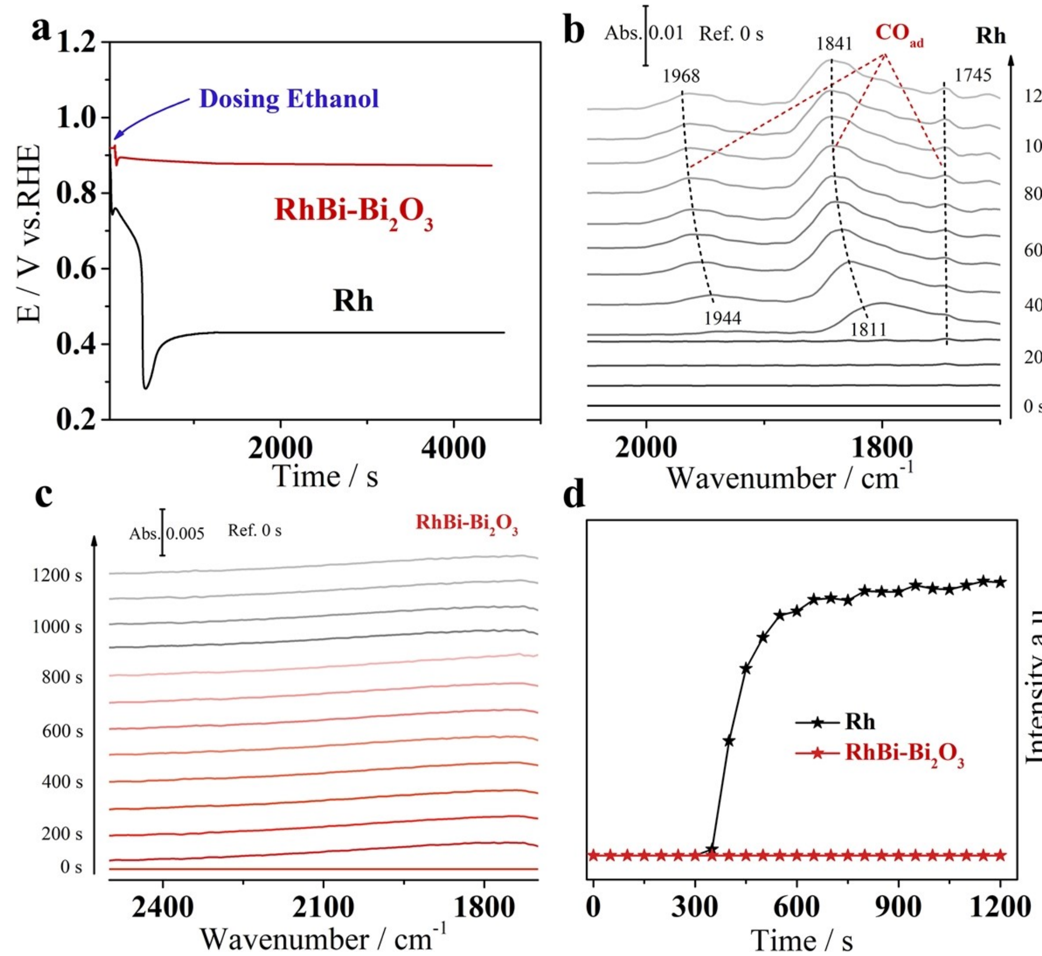

Figure S7. (a) OCP-t curves for the Rh and RhBi-Bi_2O_3 coated electrode in 0.1 M NaOH solution with the ethanol dosing at ca. 0 s. (b) and (c) respectively show the in situ electrochemical ATR-IR spectra collected on Rh and RhBi-Bi_2O_3 samples with ethanol injecting as described in (a), taken the single spectrum at 0 s as the reference spectrum. The corresponding potential-dependent band intensity variation of CO_{ad} species shown in (d). Spectral resolution is 8 cm^{-1}.

Table S1. A summary of the EOR activity and durability on Rh-based electrocatalysts surface in alkaline solution.

Sample	Electrolyte	Mass Activity ($mA \cdot mg_{Rh}^{-1}$)	stability	References
$RhBi\text{-}Bi_2O_3$	1 M NaOH +1 M C_2H_5OH	5000	53.7 % activity retention after 10000 s	This work
Rh/C	1 M NaOH +1 M C_2H_5OH	60	0 % activity retention after 10000 s	This work
$Rh\text{-}Bi(OH)_3/C$	1 M NaOH +1 M C_2H_5OH	3500	34% activity retention after 7200 s	1
$RhPb\text{-}PbO_2/C$	1 M NaOH +1 M C_2H_5OH	2636	34% activity retention after 30000 s	2
SnO_2–Rh nanosheets	0.1 M KOH + 0.5 M C_2H_5OH	213.2	46% activity retention after 3600 s	3
Excavated RhNi Nanobranches	1 M NaOH +1 M C_2H_5OH	159.0	35% activity retention after 10000 s	4
Hollow porous Rh nanoballs	1 M NaOH +1 M C_2H_5OH	78.6	10% activity retention after 3600 s	5
Cyclic Penta-Twinned Rh nanobranches	1 M NaOH +1 M C_2H_5OH	185.3	75% activity retention after 1200 s	6
Porous PdRh nanobowls	1 M KOH +1 M C_2H_5OH	682.1	58% activity retention after 12000 s	7
Rh-on-Pd nanodendrites	1 M KOH +1 M C_2H_5OH	30.1-102.8	53.7%	8

Table S2. A summary of the *ECSA* and Peak Mass Activity on RhBi-Bi2O3,Pd/C-JM and Rh/C catalysts surface in alkaline solution.

Sample	*ECSA* (cm^{-2} ug^{-1})	Peak Mass Activity (mA mg-1 Rh)
RhBi-Bi_2O_3	40.41	5000
Pd/C-JM	10.63	2000
Rh/C	6.06	60

References

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