

Supporting information for

**Evolution of Dealloyed PdBi₂ Nanoparticles as Electrocatalysts
with Enhanced Activity and Remarkable Durability in Hydrogen
Evolution Reaction**

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Tables

Table S1. Atomic percentages of PdBi₂_BA, PdBi₂_BA_D, PdBi₂_AA and PdBi₂_AA_D obtained through EDS.

Compounds	Pd (atomic %)	Bi (atomic %)
PdBi ₂ _BA	35.78	64.22
PdBi ₂ _BA_D	78.25	21.74
PdBi ₂ _AA	34.5	65.5
PdBi ₂ _AA_D	78.03	21.96

Table S2. Atomic percentages of PdBi₂_BA_D and PdBi₂_AA_D along with oxygen obtained through EDS.

Compounds	Pd (atomic %)	Bi (atomic %)	O (atomic %)
PdBi ₂ _BA_D	43.68	11.1	45.22
PdBi ₂ _AA_D	11.47	16.19	11.47

Figures

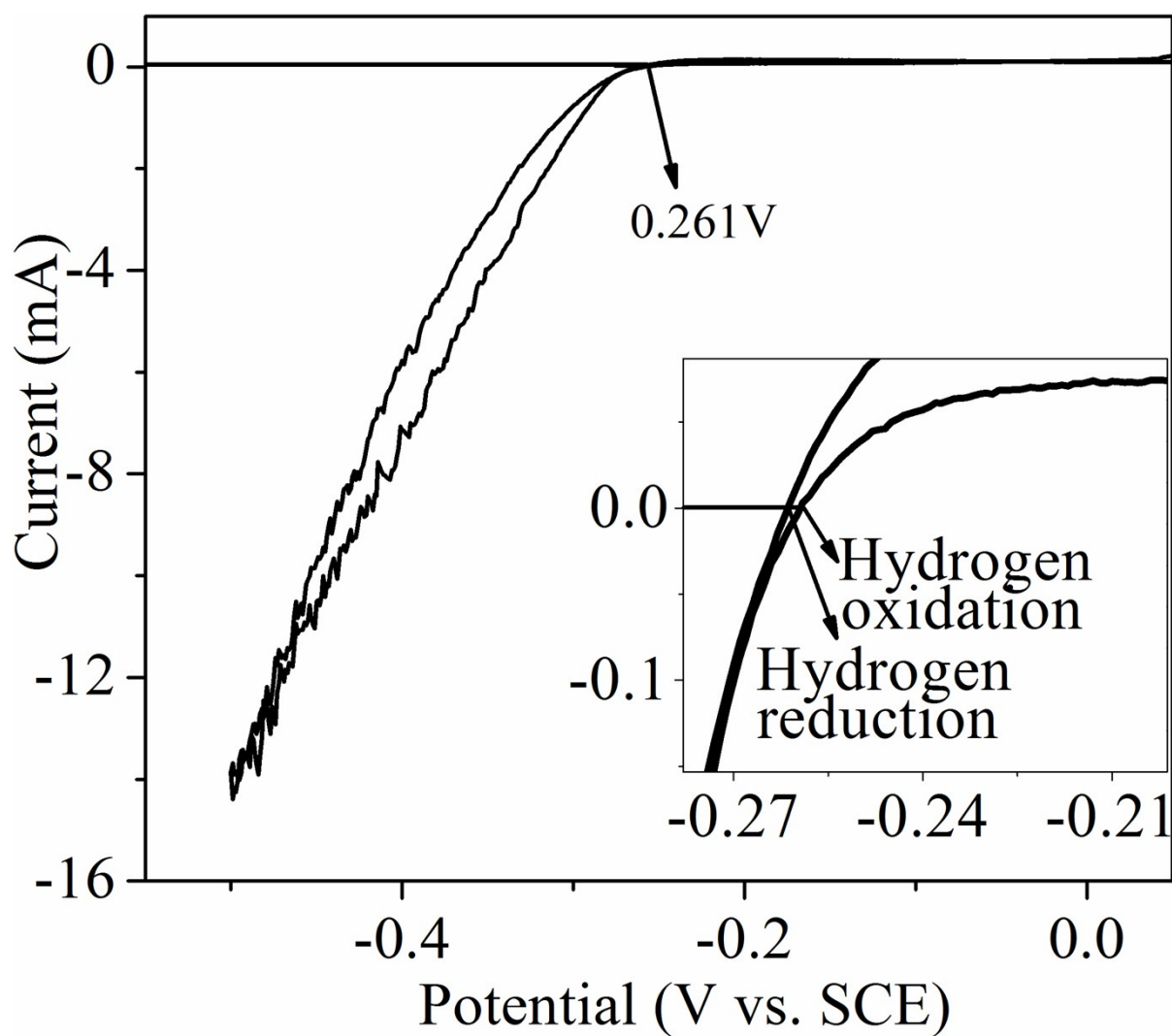


Figure S1. RHE calibration of Saturated calomel electrode (SCE) under hydrogen saturated 0.5M HClO_4 solution. The scan rate for cyclic voltammetry measurement is 1 mV/sec.

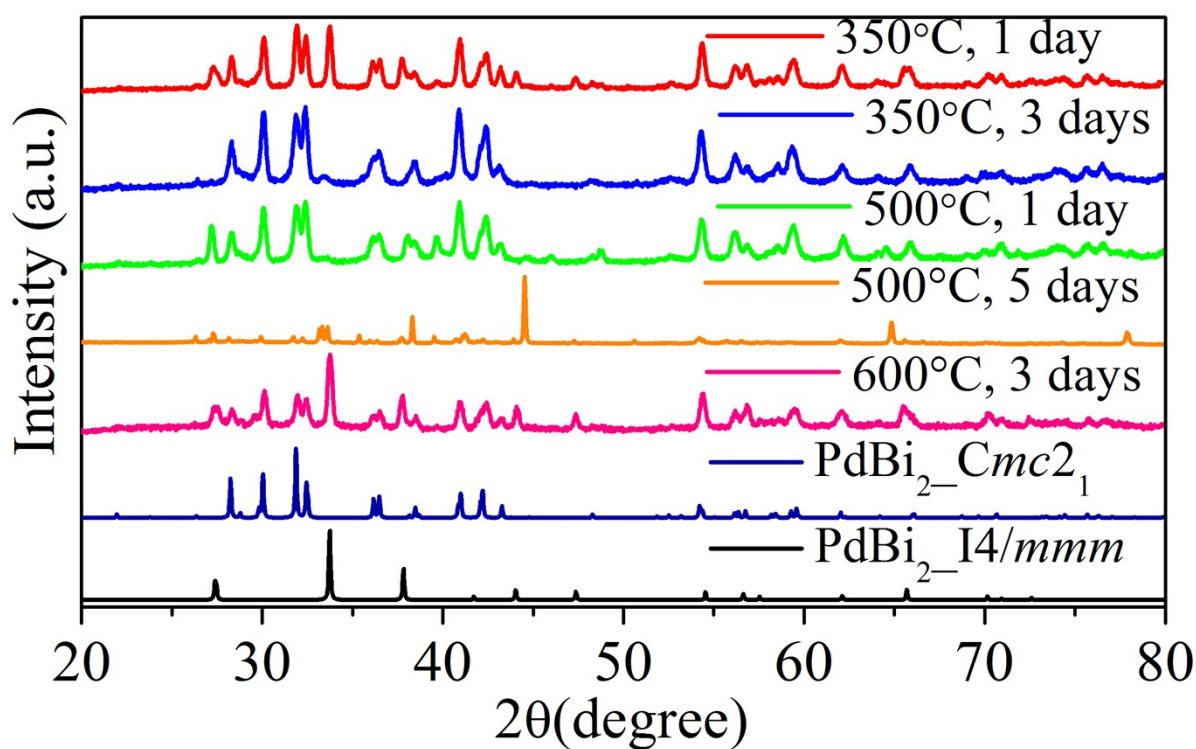


Figure S2. PXRD pattern of PdBi₂_BA at different temperatures and time intervals.

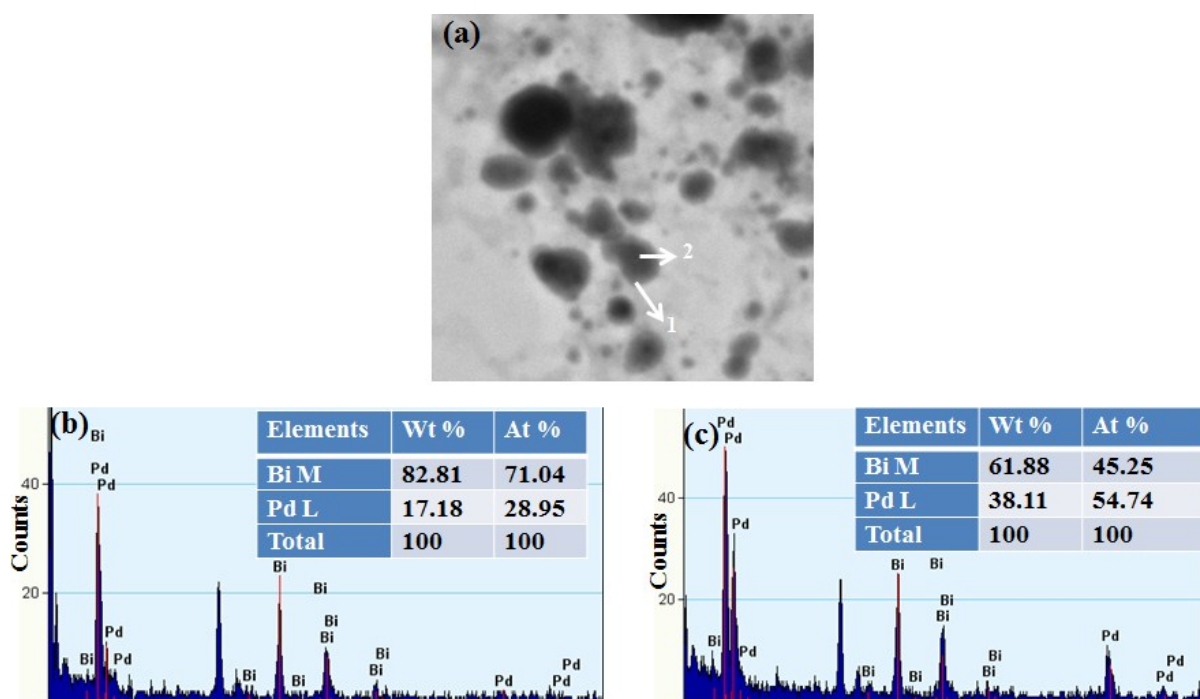


Figure S3. (a) Bright-field STEM image (b) point-EDS spectrum of the shell and (c) point-EDS spectrum of the core of PdBi₂_AA.

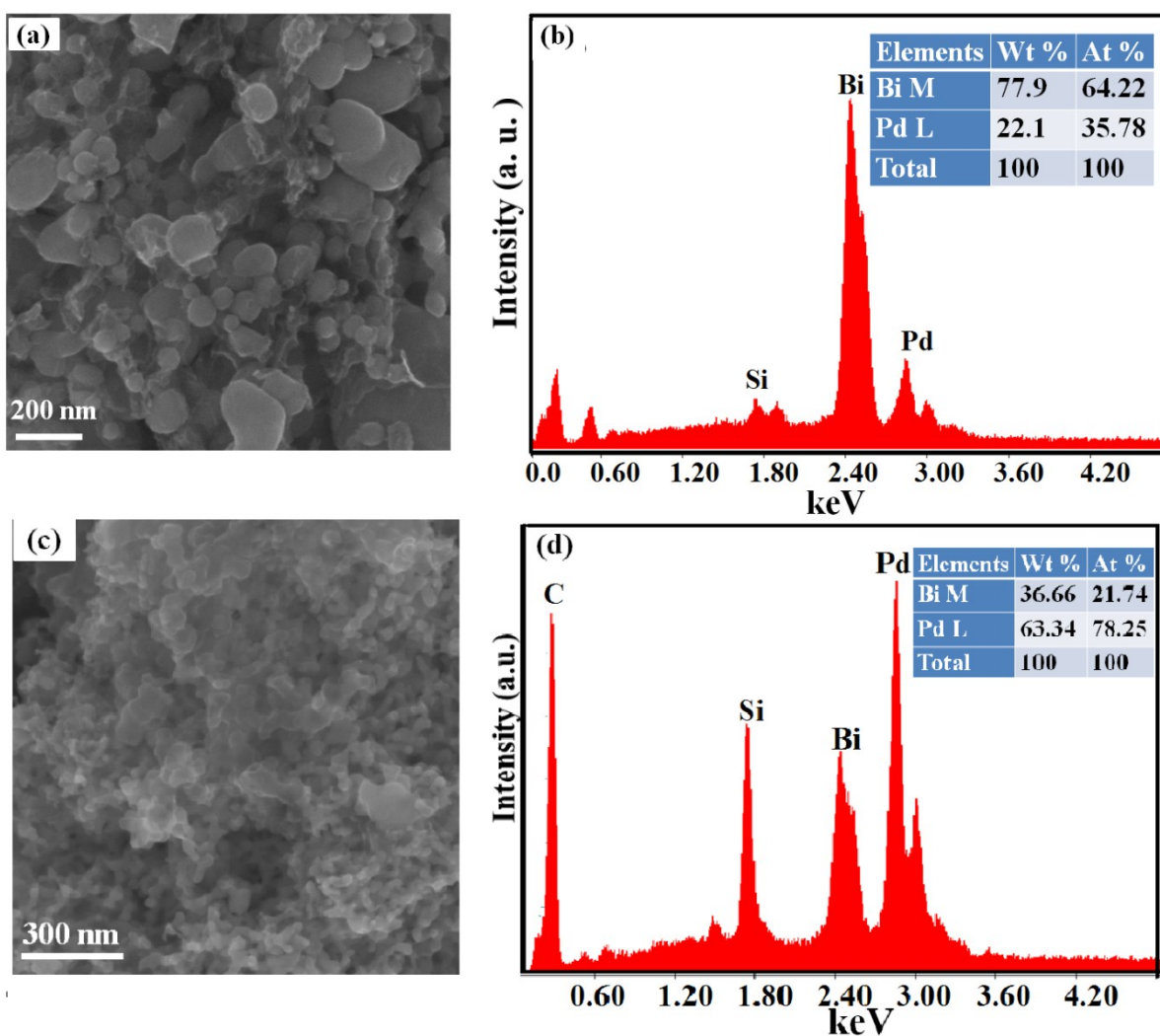


Figure S4. (a) FESEM image and (b) EDS spectra of PdBi₂_BA nanoparticles. (c) and (d) FESEM image and EDS spectra of electrochemically dealloyed PdBi₂_BA (PdBi₂_BA_D) respectively. Inset of (b) and (d) shows the elemental composition.

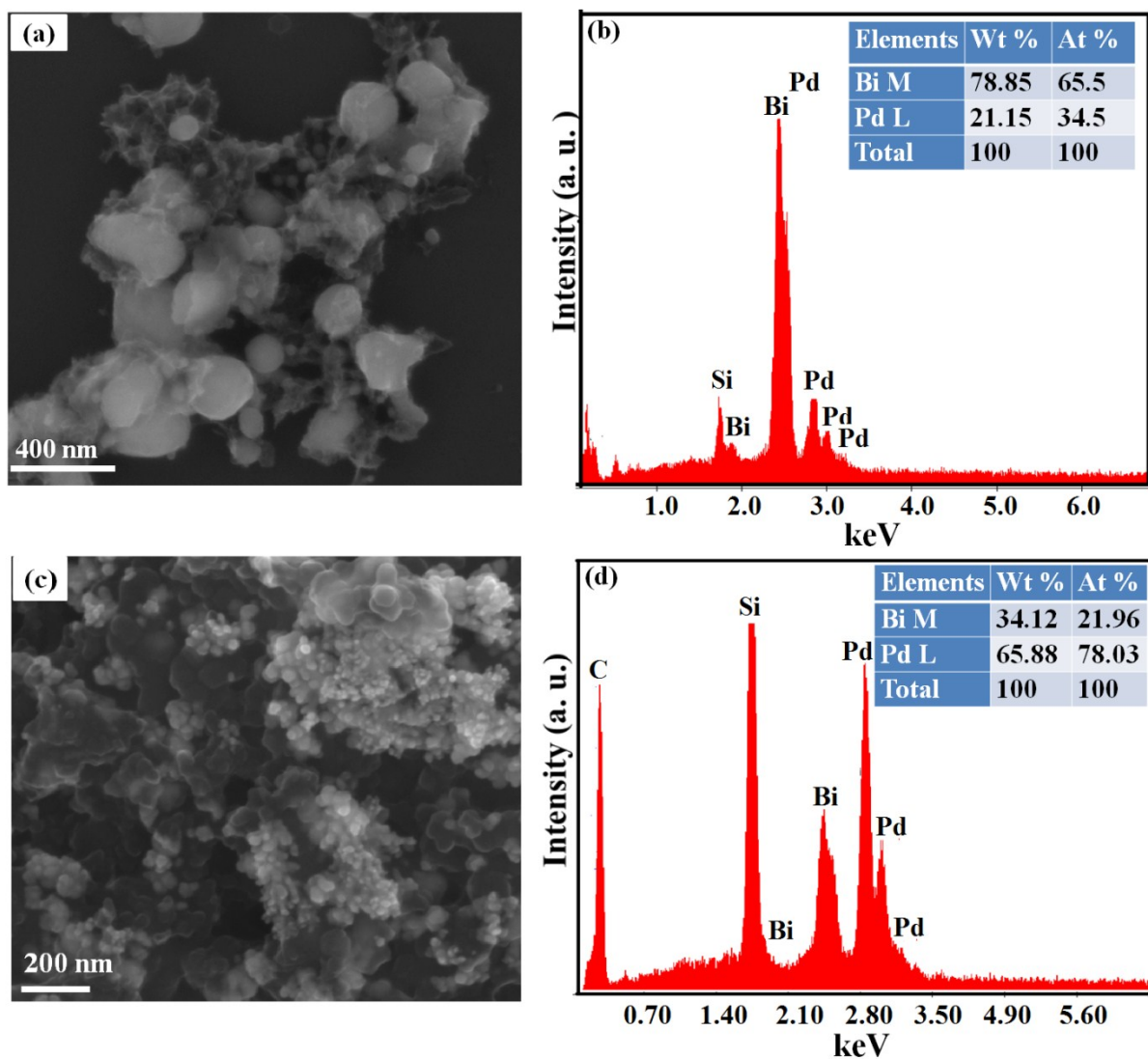


Figure S5. (a) FESEM image and (b) EDS spectra of PdBi₂_AA nanoparticles. (c) and (d) FESEM image and EDS spectra of electrochemically dealloyed PdBi₂_AA (PdBi₂_AA_D) respectively. Inset of (b) and (d) shows the elemental composition.

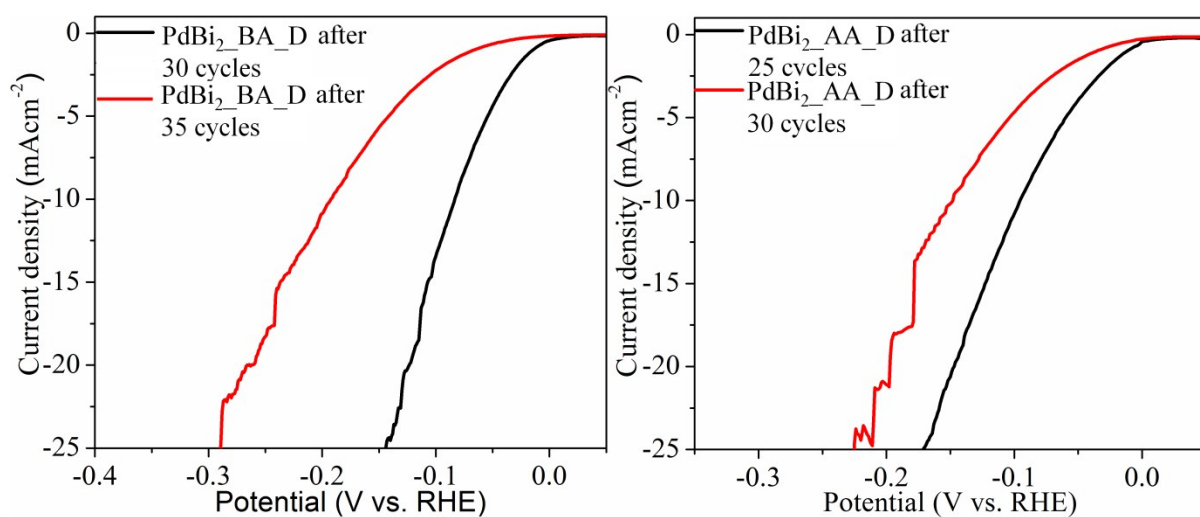


Figure S6. LSV's of (a) PdBi₂_BA_D and (b) PdBi₂_AA_D showing degradation of the catalytic activities of the respective catalysts after potential cycling.

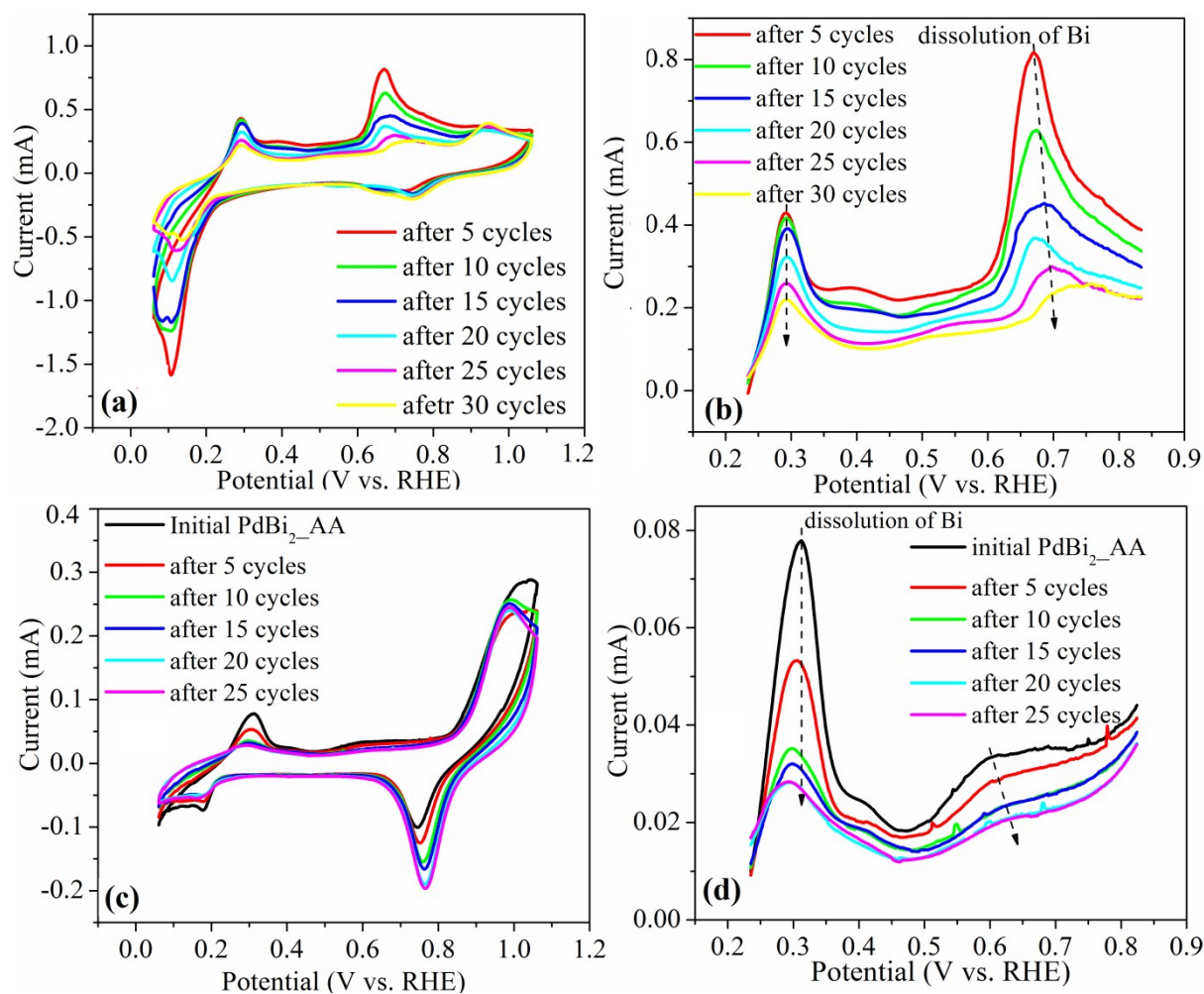


Figure S7. (a) and (c) Cyclic voltammetry (CV) curves of 30 and 25 potential cycles on PdBi₂_BA and PdBi₂_AA, respectively, in the potential range of 0.050 to 1.06 V (vs. RHE) and (b) and (d) corresponding Bi dissolution peaks in the potential range of 0.24 to 0.36 V (vs. RHE) and 0.58 to 0.76 V (vs. RHE) respectively.

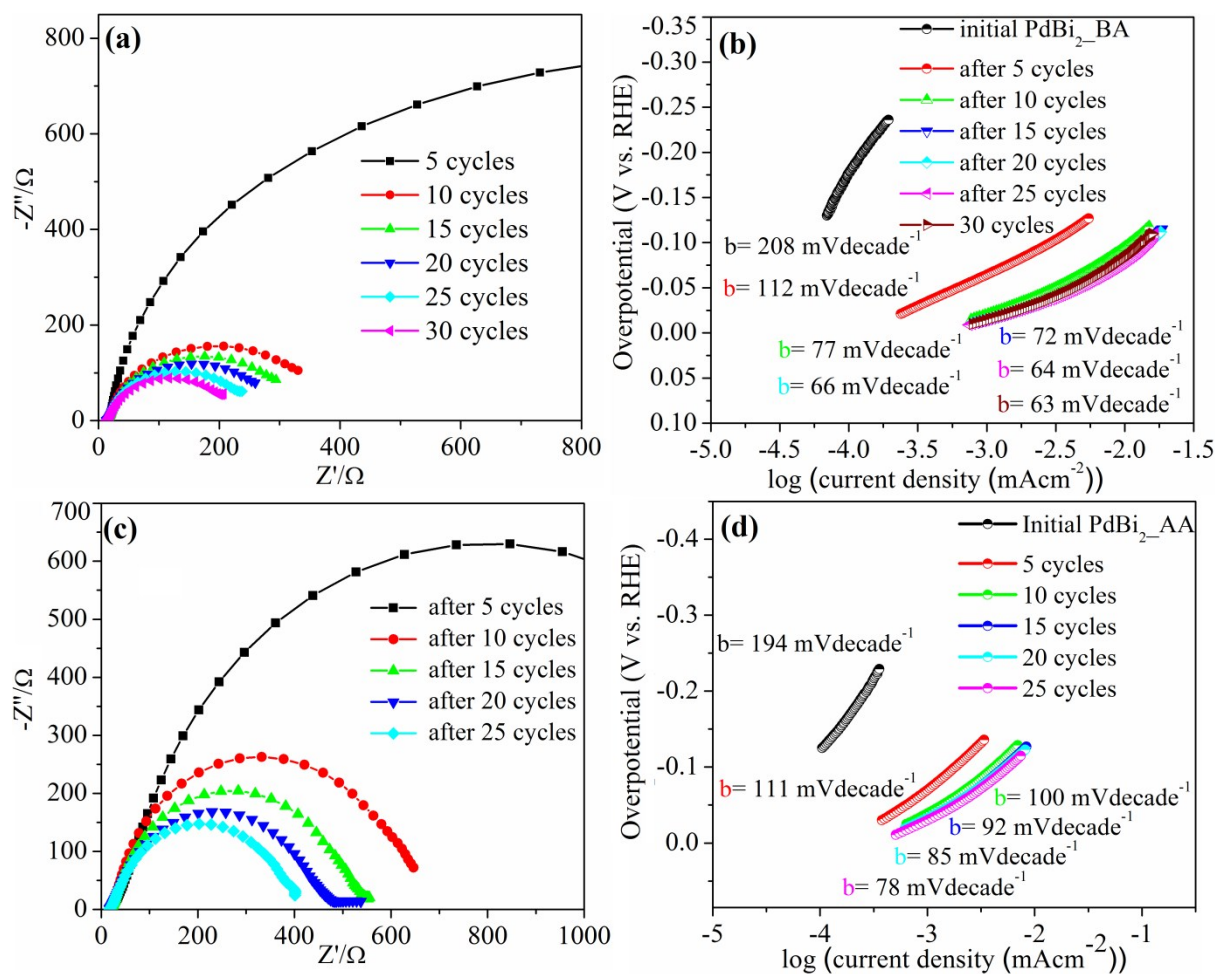


Figure S8. (a) and (c) cycle dependant Nyquist plots of PdBi₂_BA and PdBi₂_AA nanoparticles respectively. AC data obtained at and -0.04 V vs. RHE with 5 mV amplitude in 0.5M HClO₄, (b) and (d) cycle dependant Tafel slope of PdBi₂_BA and PdBi₂_AA nanoparticles.

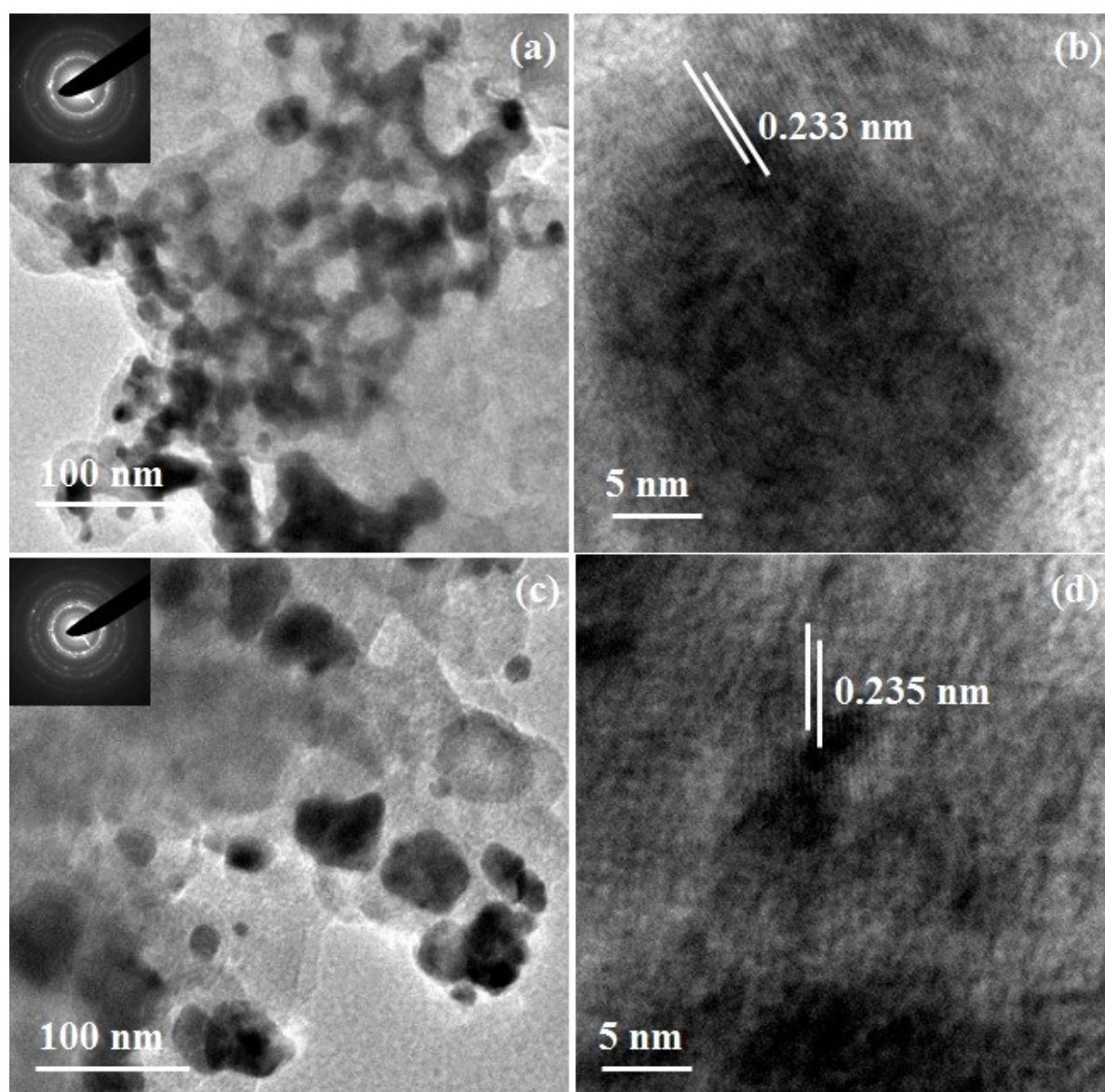


Figure S9. (a and c) TEM images and (b and d) HRTEM image of PdBi₂_BA_D and PdBi₂_AA_D respectively after stability test. Inset of (a) and (c) shows the corresponding SAED pattern.

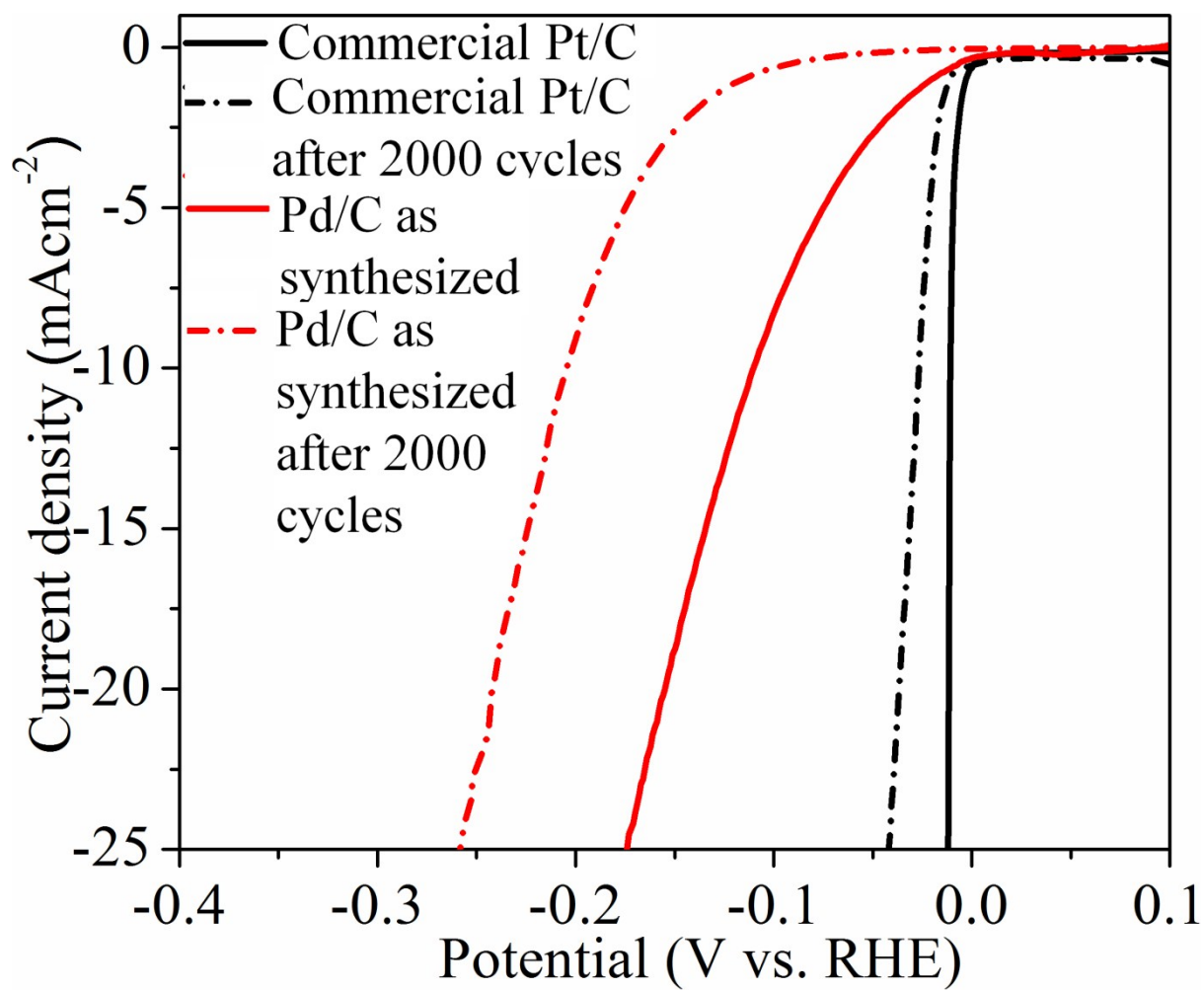


Figure S10. Comparison of LSV's of Pt/C and as synthesized Pd/C after stability test.