Electronic Supplementary Information (ESI)

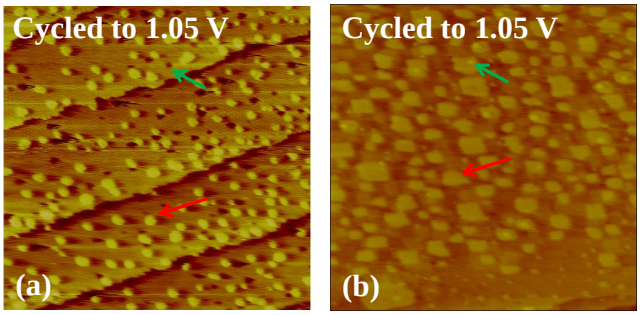

Fig. S1 (a) STM images of Pt(111) after cycled to 1.05V, red arrow points out ad-island; green arrow points out hole. (a) STM image of Pt (100) after cycled to 1.05 V, additional ad-island is pointed out by the green arrow; red arrow indicates the loss of sharp corners from those square islands.

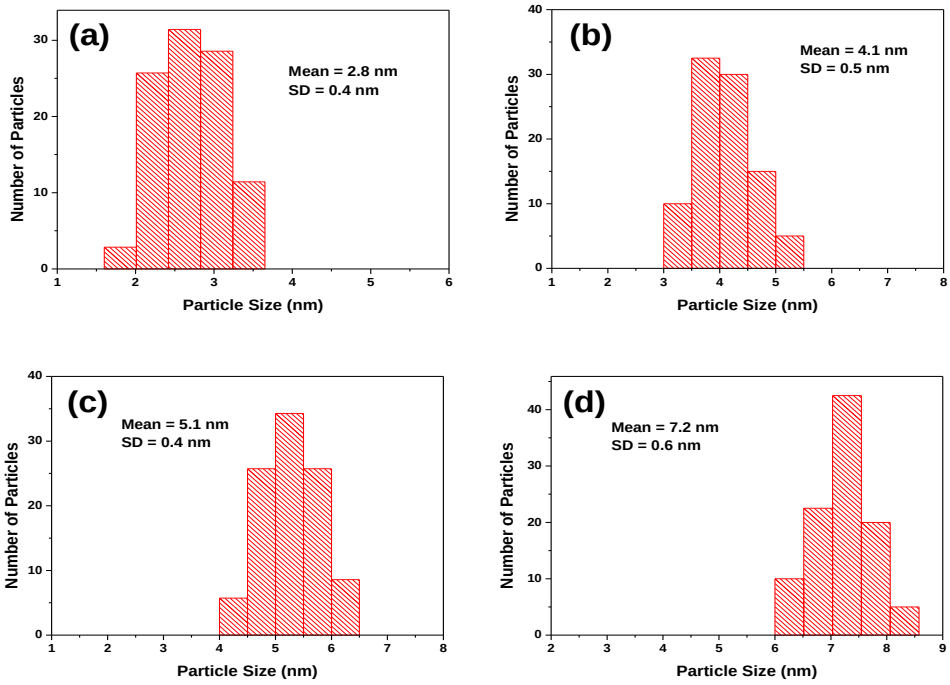

Fig. S2 Histograms of the as-synthesized (a) 2.8 ± 0.4 nm, (b) 4.1 ± 0.5 nm, (c) 5.1 ± 0.4 nm, (d) 7.2 ± 0.6 nm Pt nanoparticles. 100 particles were counted for each of them.

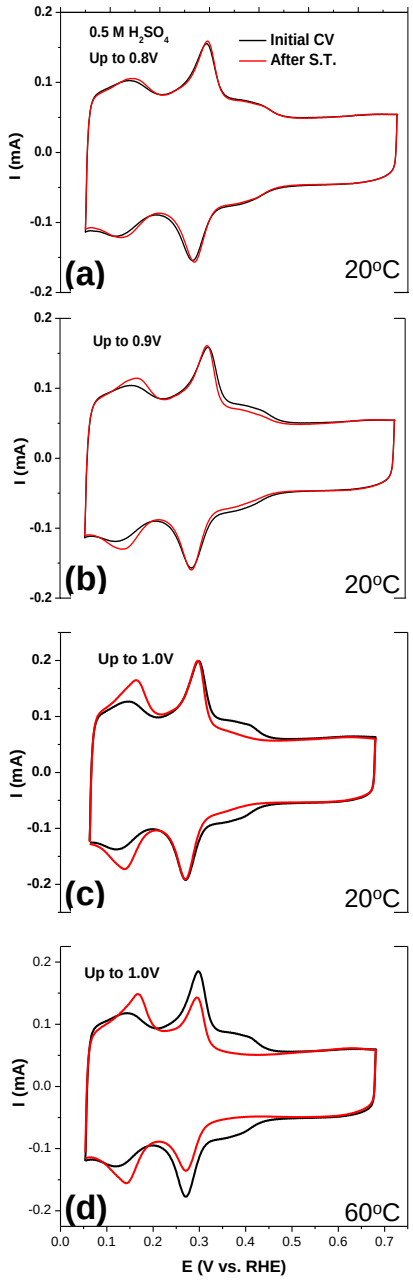

Fig. S3 Cyclic voltammograms (CVs) of Pt nanocubes on carbon support before and after 4000 potential cyclings from 0.6V to (a) 0.8 V (b) 0. 9V (c) 1.0 V (d) 1.0 V. (a) to (c) were conducted at room temperature (20 ˚C). (d) was conducted at 60 ˚C. All the CVs were recorded in 0.5 M H_2SO_4. The potential cycling was conducted in 0.1 M $HClO_4$.

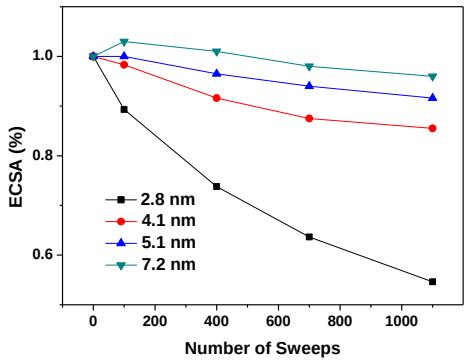

Fig. S4 Changes of electrochemically active surface area (ECSA) during potential cycling between 0.6V and 1.1V at 50mV/s, 60˚C in 0.1 M perchloric acid.

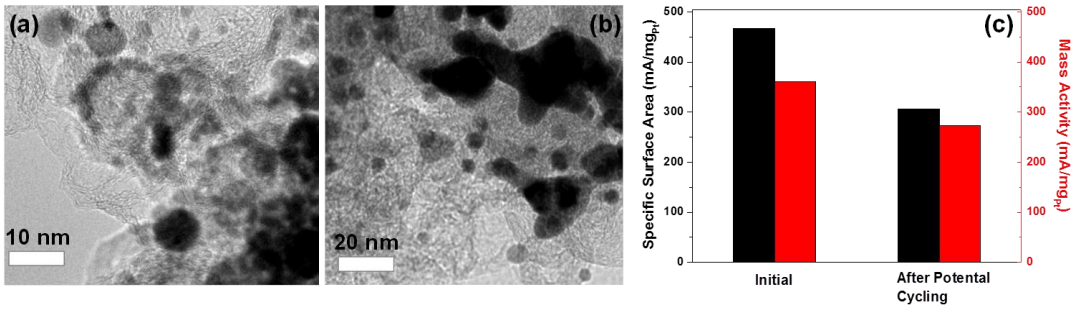

Fig. S5 Mixed 2.8 nm and 7.2 nm catalyst suspension: TEM images (a) before and (b) after stability test, (c) Specific surface area (black) and ORR mass activity at 0.90V (Red) before and after stability test. Same stability test protocol was used. (i.e. 60˚C, scan between 0.6V and 1.1V for 4000 sweeps at 50mV/s in 0.1M perchloric acid).

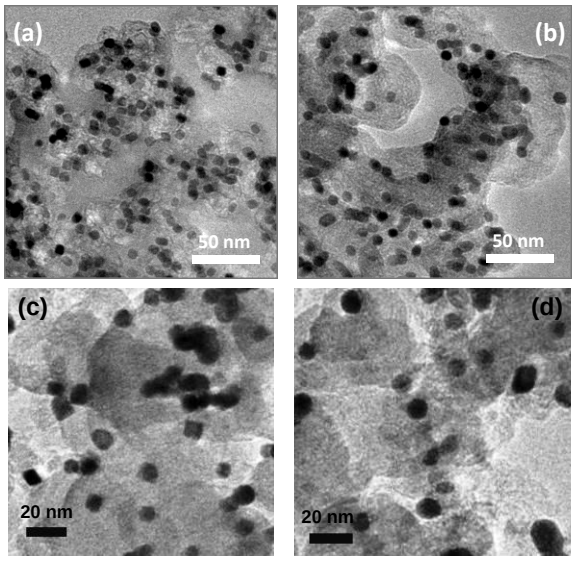

Fig. S6 TEM images of nanocubes (a) before and (b) after stability test. TEM images of nano-octahedrons (c) before and (d) after stability test. Stability test protocol is the same as in Figure S5.