

Electronic Supplementary Information (ESI)

Facet Effects of Palladium Nanocrystals for Oxygen Reduction in an Ionic Liquid and Sensing Applications

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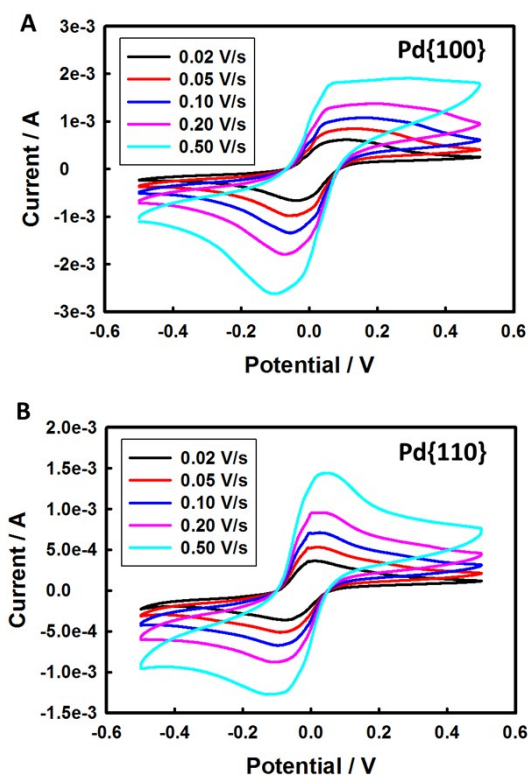


Figure S1. Cyclic voltammograms at different scan rate of (A) cubic palladium nanocrystals (B) RD palladium nanocrystals in [Bmpy][NTf₂] with 0.01 M ferrocene (third cycle). Based on Randles-Sevcik equation ($I_p = 268600n^{3/2}AD^{1/2}Cv^{1/2}$), the redox reaction of ferrocene/ferrocenium can be used for obtaining the relationship between peak current and surface area. The electrochemically active areas (ECAs) for Pd{100} and Pd{110} are 32.49 cm² and 37.49 cm², respectively.

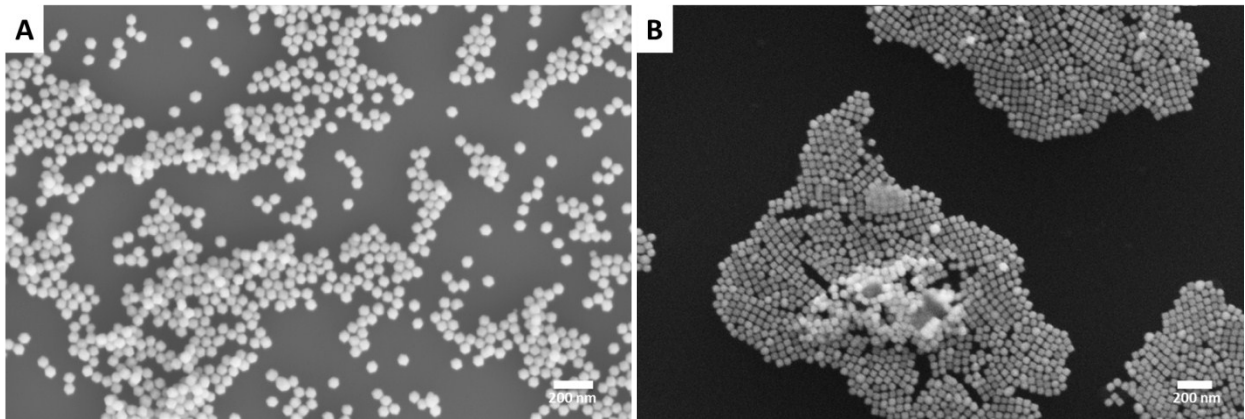


Figure S2. SEM images of (A) RD, (B) Cubic Pd nanocrystals after 300 °C annealing, the unchanged morphology confirmed their unchanged facet of $\{110\}$ and $\{100\}$ for RD and cubic Pd nanocrystal, respectively.

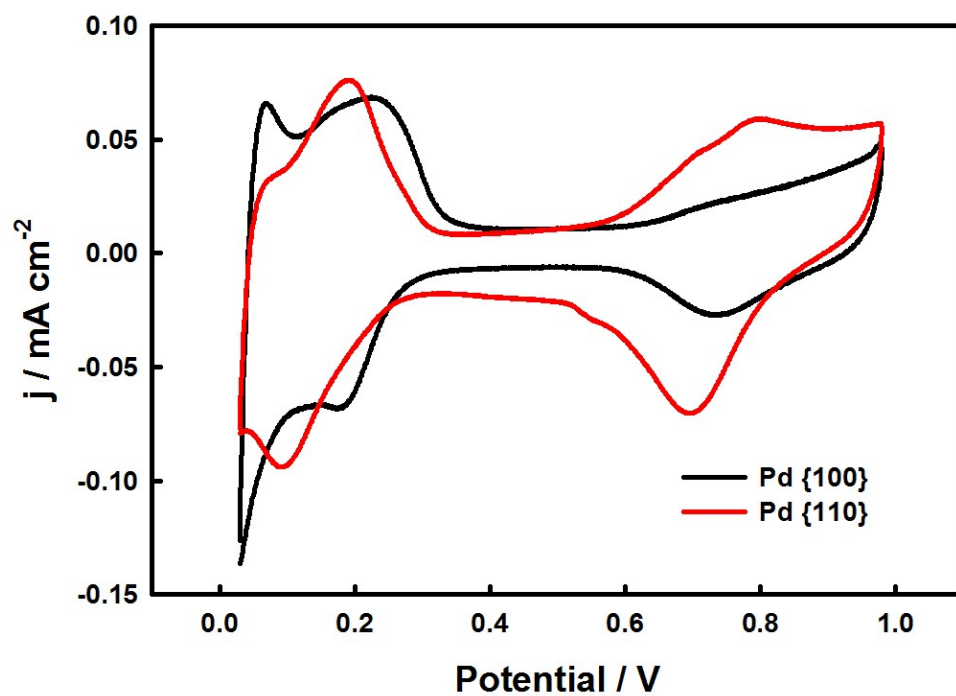


Figure S3. Cyclic voltammograms of palladium nanocrystal electrodes in 0.1 M HClO_4 solution after annealing treatment (third cycle), scan rate: 100 mV/s (potential vs. RHE).

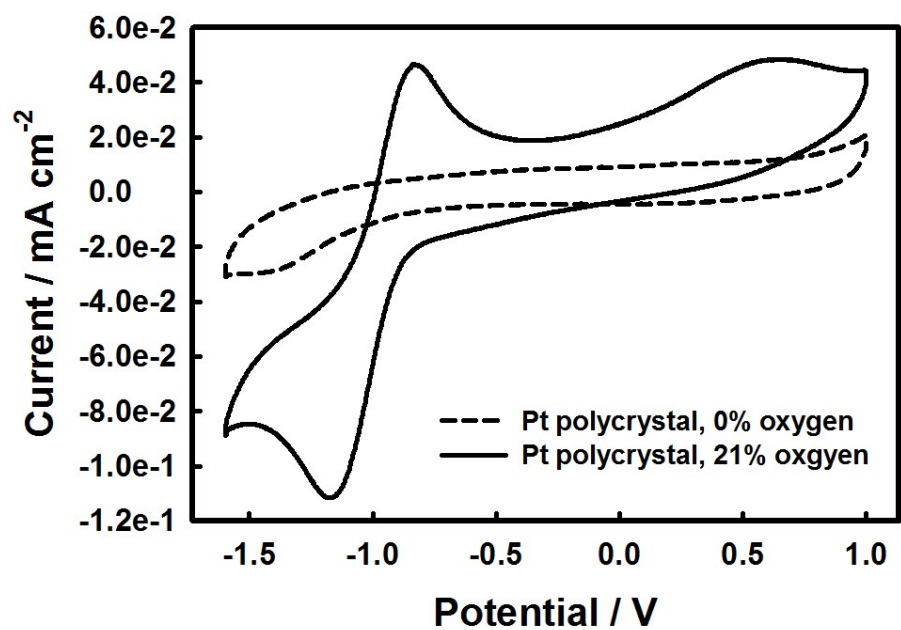


Figure S4. Cyclic voltammograms of polycrystalline platinum electrodes in (solid) 21% v/v oxygen concentration, (dash) pure nitrogen (third cycle). Scan rate: 0.1 V/s.

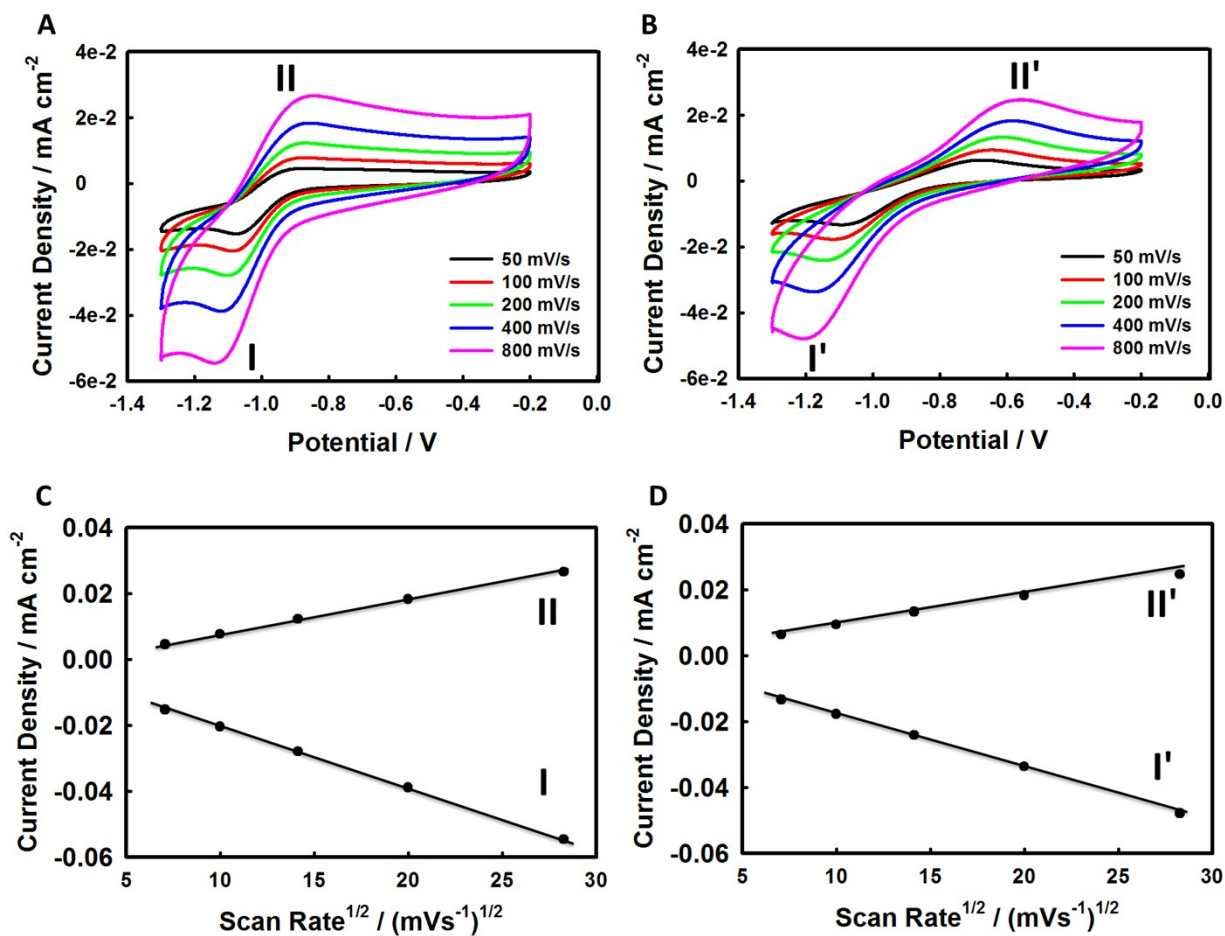


Figure S5. Different scan rates of cyclic voltammograms for (A) cubic (B) RD Pd nanocrystals in [Bmpy][NTf₂] at (10%, v/v) oxygen. Peak current vs. square root of scan rate plots for (C) cubic (D) RD Pd nanocrystal.

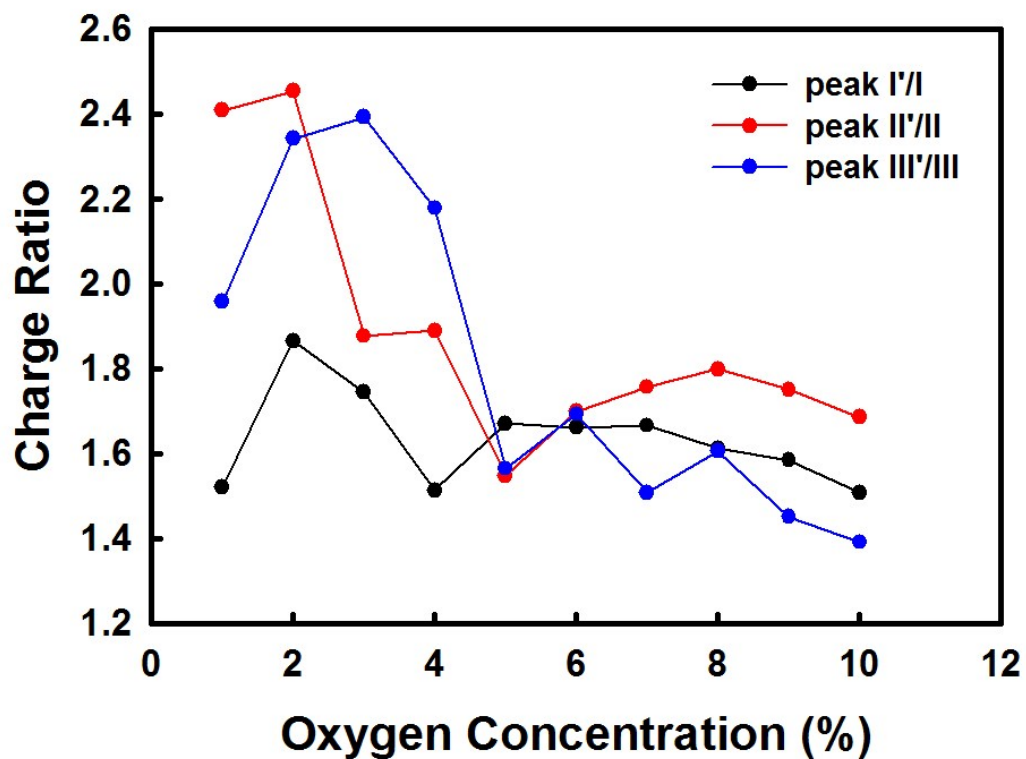


Figure S6. Charge ratio of oxygen redox peaks for two types of palladium nanocrystals in [Bmpy][NTf₂] obtained in Figure 2A and 2B.

Table S1. The names and structures of ionic liquid and possible deprotonated cation structures

[NTf ₂] ⁻		[Bmpy] ⁺	
[Bmpy] _{de} ⁺ (1)		[Bmpy] _{de} ⁺ (2)	