Supplementary Information for

Oxidation-state dependent electrocatalytic activity of iridium nanoparticles supported on graphene nanosheets

Jun Ho Shim,‡ Ji Eon Kim,‡ Yun-Bin Cho, Chongmok Lee and Youngmi Lee*

aDepartment of Chemistry & Nano Science, Ewha Womans University, Seoul 120-750, Korea

bDepartment of Chemistry, Daegu University, Gyeongsan 712-714, Korea

‡Authors equally contributed to this work.

*To whom all correspondence should be addressed: youngmilee@ewha.ac.kr

Tel: (+82) 2-3277-6652; Fax: (+82) 2-3277-2384
Fig. S1. Typical SEM images of (a) pRGO and (b) Ir NP/pRGO nanocomposites.
**Fig. S2.** Particle size distribution of the Ir nanoparticles immobilized on pRGO nanosheets.
Fig. S3. XPS spectra of (a) Ir NP/pRGO-air and (b) Ir NP/pRGO-H₂ for Ir 4f region.
Fig. S4. Comparison of (a) RDE voltammograms and (b) K-L plots (at +0.1 V vs. SCE) for ORR in an O₂-saturated 0.5 M H₂SO₄ solution at GC electrodes modified with Ir NP/pRGO-Ar, commercial Pt/C, and bulk Pt (disk electrode, Pt disk diameter = 3 mm). Rotation speed, 900 rpm and scan rate, 10 mV s⁻¹. Current densities \( J \) were obtained via the current normalization with respect to the corresponding electrode GSA, as determined by the CC method.
**Fig. S5.** RDE voltammograms for ORR in an O₂-saturated 0.5 M H₂SO₄ solution at the Ir NP/pRGO-Ar-modified GC electrode depending on rotation speed with a scan rate of 10 mV s⁻¹.
**Fig. S6.** RDE voltammograms before and after repetitive 200 runs obtained with Ir NP/pRGO-Ar-modified GC electrode in an O₂-saturated 0.5 M H₂SO₄ solution at a rotation rate of 1600 rpm. All the other conditions are the same as in Figure 5.