Supporting Information Polyoxometalate-Mediated Green Synthesis of 2D Silver Nanonet/Graphene Nanohybrid as a Synergistic Catalyst for Oxygen Reduction Reaction

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We dedicate this paper to the memory of Prof. Louis Nadjo, who passed away in October 2012.



Fig. S1 Digital graphs of the color change during the reaction. (a) The aqueous solution of the POM; (b) Just after mixed with aqueous solution of Ag_2SO_4 and GO; (c) Reacted for 5 h; (d) Reacted for 12 h.



Fig. S2 (a) Digital graph of the designed container used for preparation of modified electrodes; (b) Digital graphs of the bare GC electrode (1) and the as prepared modified electrodes for Ag NN@POM (2) and Ag NN@POM-GNSs (3), respectively.

RHE calibration

The SCE was calibrated with respect to RHE in all measurements. The calibration was performed in the high purity hydrogen saturated 0.1 M NaOH electrolyte with a Pt wire as the working electrode and a Pt foil as the counter electrode, respectively. CVs were run at a scan rate of 1 mV s⁻¹, and the average of the two potentials at which the current crossed zero was taken to be the thermodynamic potential for the hydrogen electrode reactions (Fig. S3). That is, E (RHE) = E (SCE) + 1.024 V.



Fig. S3 SCE calibration with respect to RHE in 0.1 M NaOH electrolyte.



Fig. S4 EDX analysis of Ag NN@POM-GNSs.



Fig. S5 Typical TEM image of as-obtained Ag NN@POM.



Fig. S6 Cyclic voltammograms run in pure 0.5 M H₂SO₄ medium (V_{H_2O} : V_{DMF} = 1 : 1) with a glassy carbon electrode modified with Ag NN@POM (a) and Ag NN@POM-GNSs (b) before and after electro-catalytic ORR. The scan rate was 50 mV s⁻¹.



Fig. S7 SEM images of the Ag NN@POM (a) and Ag NN@POM–GNSs (c) before ORR; (b) and (d) are the SEM images of the same Ag NN@POM and Ag NN@POM–GNSs after ORR, respectively.

Table S1. The numbers of electrons transferred for ORR on the electrodes calculated from the slopes of the Koutecky–Levich plots (shown in Fig. 7, see in the text) at various potentials.

Electron Electrode number Potential	Ag NN@POM	Ag NN@POM-GNSs
0.40 V vs. RHE	3.93	3.95
0.45 V vs. RHE	3.95	3.93
0.50 V vs. RHE	3.89	3.85
0.55 V vs. RHE	3.92	3.84