## **Supporting Information**

## Facile Preparation of Nitrogen-doped Graphene as Efficient Oxygen Reduction

## Electrocatalysts

Xiaochun Gao, <sup>[a]</sup> Liwei Wang, <sup>[a]</sup> Jizhen Ma, <sup>[a]</sup>Yueqing Wang, <sup>[a]</sup> and Jintao Zhang\*<sup>[a]</sup>

<sup>a.</sup> Key Laboratory of Colloid and Interface Chemistry, Ministry of Education, School

of Chemistry and Chemical Engineering, Shandong University, P.R. China

E-mail: jtzhang@sdu.edu.cn



**Fig. S1.** Digital images for (A) the preparation of GMN (left to right: melamine solution, GO solution, mixture of GO/melamine, GMN). (B) GO/melamine/HNO<sub>3</sub> precursors (GMN-1, GMN, GMN-5) obtained at various ratios of melamine over GO (R=1, 3, 5) and (C) the obtained precursors in the presence of  $H_2SO_4$ , HNO<sub>3</sub>, and  $H_3PO_4$ , respectively (GMS, GMN, GMP).



Fig. S2. XRD patterns of GO, melamine, melamine/acid composites and GMS, GMP.



Fig. S3. Linear sweep voltammogram (LSV) curves for A) NA-rGO-1; B) NA-rGO-5;C) SA-rGO; D) PA-rGO; E) rGO; F) Pt/C at various rotating speeds, respectively.



**Fig. S4.** Koutecky–Levich plots for A) NA-rGO-1; B) NA-rGO-5; C) SA-rGO; D) PA-rGO; E) rGO; F) Pt/C obtained from LSVs.

Materials E vs. RHE (V)	NA-rGO-1	NA-rGO	NA-rGO-5	SA-rGO	PA-rGO	rGO	Pt/C
0.55	4.1	4.0	4.1	3.4	3.5	2.8	4.0
0.65	3.9	3.9	4.0	3.3	3.4	2.9	4.1
0.75	3.9	3.9	3.9	3.4	3.4	3.0	4.0
0.85	3.8	3.9	4.0	3.2	3.5	3.3	4.1
0.95	3.8	4.0	4.0	3.3	3.5	3.2	4.0

**Table S1.** n (electron transfer number) obtained for NA-rGO-1, NA-rGO-5, SA-rGO,PA-rGO, rGO, and Pt/C obtained from K-L plots.



Fig. S5. OER curves of all catalysts in 0.1 M KOH (scan rate, 5 mV s<sup>-1</sup>).

**Table S2.** Surface compositions of the as-prepared catalysts obtained from the XPS

 analysis.

Sample	$C^1$	$N^{1}$	0	$S^1$	$P^1$	N/C <sup>2</sup>	S/C <sup>2</sup>	P/C <sup>2</sup>
NA-rGO	84.91	7.27	5.60	-	-	8.6	-	-
SA-rGO	88.10	3.71	4.76	0.48	-	4.2	0.5	-
PA-rGO	85.94	4.31	6.44	-	0.39	5.0	-	0.5
NA-rGO-1	92.65	3.53	4.82	-	-	3.8	-	-
NA-rGO-5	86.89	6.98	4.13	-	-	8.0	-	-

<sup>1</sup> at. %

<sup>2</sup> relative atomic ratio $\times 100$  (%)



Fig. S6. (A) Survey X-ray photoelectron spectra, the core-level (B) C1s, (C) N1s XPS

spectra.



**Fig. S7.** The high resolution XPS spectra of (A) S-2p or SA-rGO, (B) PA-2p for PA-rGO.



**Fig. S8.** Current-time chronoamperometric response of NA-rGO and Pt/C in  $O_2$ -saturated A) 0.1M KOH; B) 0.1M KOH with the addition of 3 M methanol solution; Cyclic voltammograms of C) NA-rGO and D) Pt/C in N<sub>2</sub>-saturated 0.1M KOH,  $O_2$ -saturated 0.1 M KOH, and  $O_2$ -saturated 0.1M KOH/3M CH<sub>3</sub>OH solution.