Supporting Information

1. Preparetion of GO GH and N-GH

Synthesis of GO:60 mL H_2SO_4 was added to 2 g graphite in an ice bath. The resulting preoxidized product was added to 10g $KMnO_4$ slowly. The mixture was then heated to 30℃ and stirred for 3 hours. Subsequently, 350 mL of water was added drop by drop and controlled the temperature under 90℃. After 30 mins stirring, 10 mL 30% H_2O_2 was injected into the solution to react with the excess $KMnO_4$. Finally, the resulting mixture was washed and then freeze-dried.

Synthesis of N-GH: a 2 mg/ml solution of graphene oxide was prepared firstly. Then, 1 mL GO solution and 2mL(1 mL, 500μL) ammonia were placed together with the weight ratio of $NH_3 \cdot H_2O$/GO =1:2(1:4,1:8). Subsequently, 52μL Na_2S was added into the solution. Finally, the samples were placed in the oveb and heated at 90℃ for 8 hours. After cooling to room temperature, the N-GH samples were obtained.

Synthesis of GH: a 2 mg/ml solution of graphene oxide was prepared firstly. Then, 1 mL GO solution and 2mL(1 mL, 500μL) deionized water.Subsequently, 52μL Na_2S was added into the solution. Finally, the samples were placed in the oveb and heated at 90℃ for 8 hours. After cooling to room temperature, the GH samples were obtained.

2. EDS images of the GH and N-GH

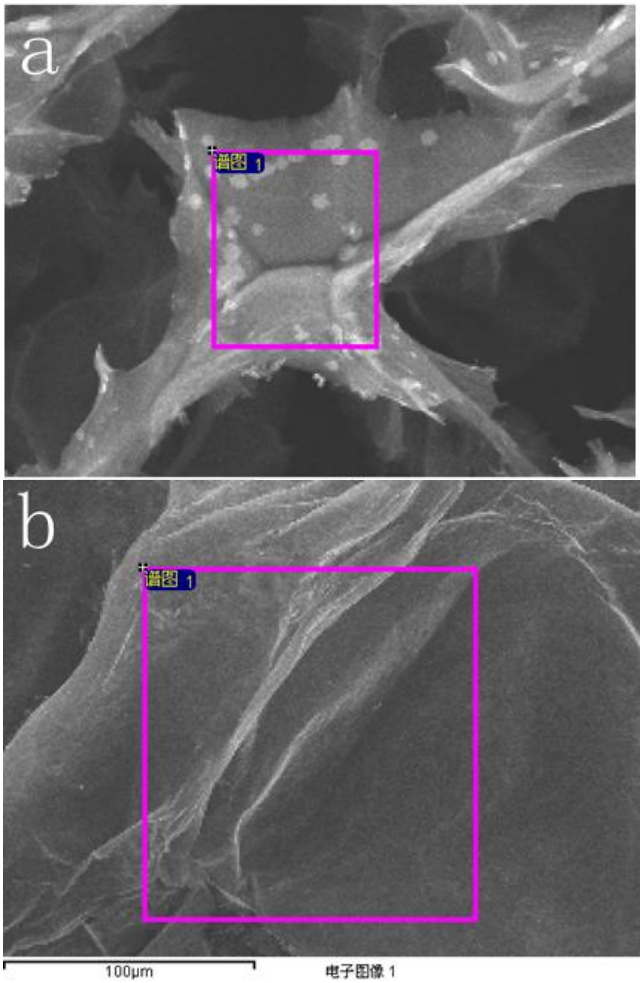

Fig. S (a) EDS images of the N-GH (b) EDS images of the GH

Table 1

sample	*C* *content(at%)*	*O* *content(at%)*	*N* *Content(at%)*
N-GH4	76.59	9.58	13.44
GH	83.90	10.58	0

Figure S1 and table 1 indicates that the reaction between NH3 and oxygenic groups in GO has been completed and results in a high atomic percentage of N up to 13.44% in N-GH.