Supporting Information:

A simple approach towards nitrogen-doped graphene and metal/ graphene by solid-state pyrolyses of metal phthalocyanine

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XPS: In the survey scan of XPS, the peaks at 284.60 and 398.73 eV correspond to C1s peak of sp^2 carbon and N1s peak of the doped nitrogen, respectively. In the high resolution scan, the asymmetric N1s peak can be divided into two components, indicating that nitrogen atoms were in two different binding states inserted into graphene network: the peak at 398.74 eV corresponds to "pyridinic" nitrogen, and the peak at 401.12 eV was due to quaternary nitrogen in the graphene. The pyridinic nitrogen bonds with two carbon atoms at the edges or defects of graphene and contributes one p electron to the π system; the quaternary nitrogen corresponds to the highly coordinated nitrogen atoms that replaced carbon atoms in the hexagonal ring. Other two peaks appeared at 285.72 and 287.33 eV corresponding to carbon were assigned to the sp^2 and sp^3 carbon atoms, respectively. A small peak at 289.23 eV was ascribed to the physical adsorption of oxygen on the graphene. Generally speaking, the peak at high energy in the C1s spectrum suggested the nitrogen doping occurred in the graphene. Calculated from XPS data, the atomic percentage of nitrogen in the as-obtained nitrogen-doped graphene was found to be ~3.85%. The XPS results along with the D band and G band in the Raman spectra mentioned earlier suggested that the doping nitrogen hetero-atoms have been substituted for carbon atoms in the graphene lattice.

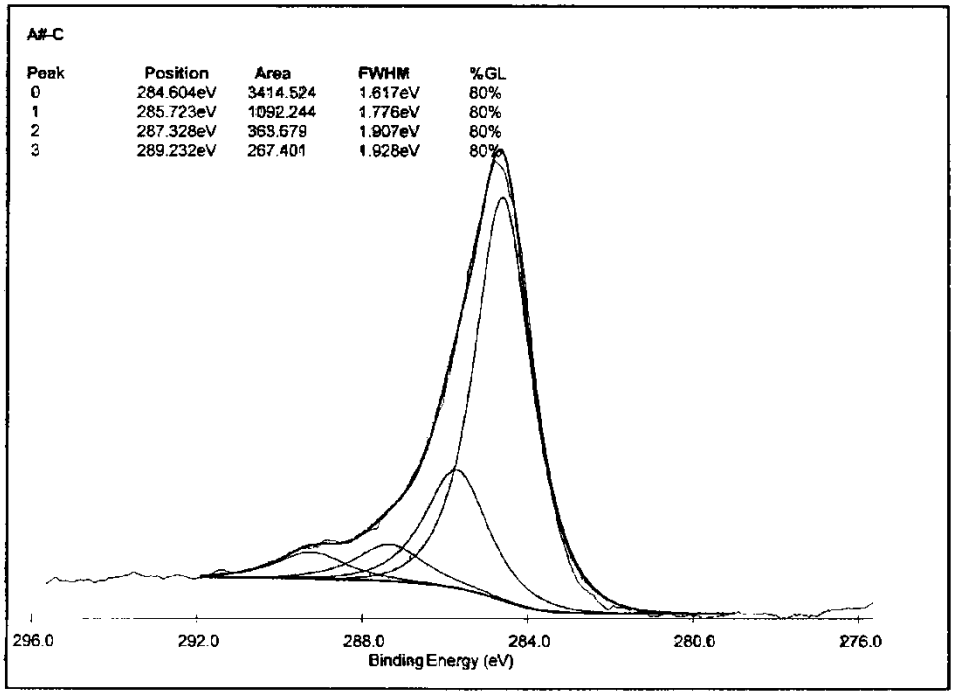

Figure 1 High-resolution C1s XPS survey for the nitrogen-graphene pyrolysised from CuPc molecular under Ar atmosphere on the ceramic griddle.

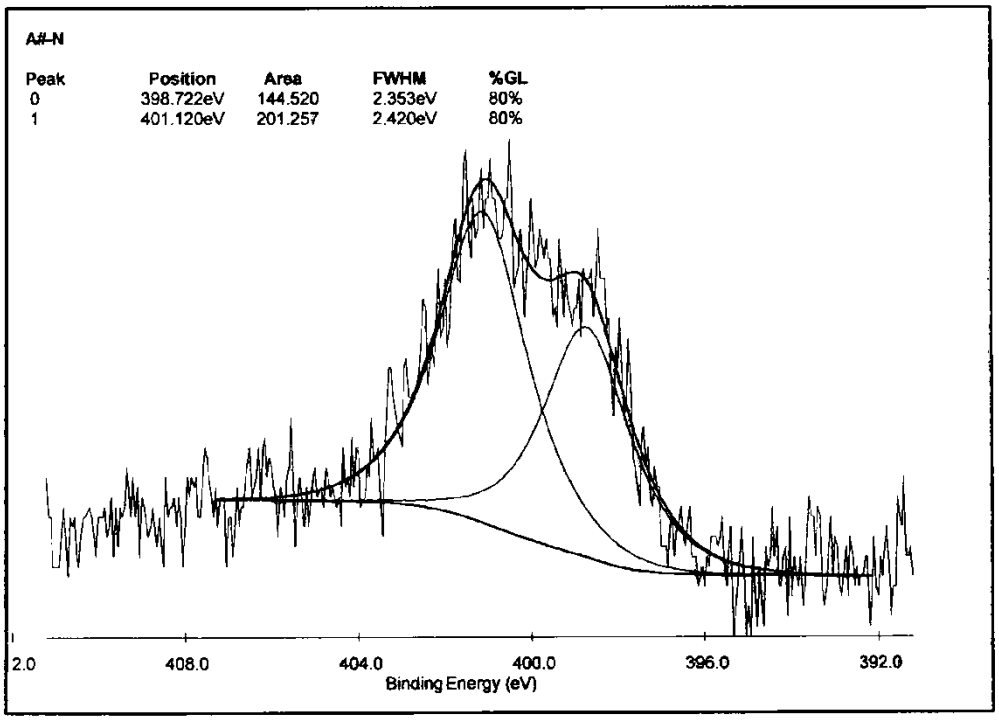

Figure 2 High-resolution N1s XPS survey for the nitrogen-graphene pyrolysised from CuPc molecular under Ar atmosphere on the ceramic griddle.