Facile synthesis of graphene/N-doped carbon nanowire composites as an effective
electrocatalyst for the oxygen reduction reaction

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Here, we report a facile method to synthesize reduced graphene oxide decorated by nitrogen-doped carbon nanowires (rGO-CN) as an electrocatalyst for ORR. After the polymerization of polyrrole (PPy) nanowires on reduced graphene oxide (rGO) surface (rGO-PPy), the carbonization of rGO-PPy at 800 oC results in the unique nanostructured product by the integration of rGO sheets and the N-doped carbon nanowires with high content of nitrogen. The morphology of rGO-CN is confirmed by TEM analysis and the chemical composition and interaction of the prepared samples are analyzed by XPS and FT-IR analysis. The electrocatalytic activity of rGO-CN toward ORR is also evaluated by the cyclic voltammetry. It is found that the rGO-CN electrode shows the superior eletrocatalytic performance toward ORR, compared to rGO amd rGO-PPy. It is believed that the combination of N-doped carbon nanowires and rGO might be promising for the enhanced electrocatalytic property towards ORR as a carbon based metal-free electrocatalyst.