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Electronic supplementary information (ESI)

Surface-Coating Synthesis of Nitrogen-Doped Inverse Opal Carbon Materials with Ultrathin Micro/Mesoporous Graphene-Like Walls for Oxygen Reduction and Supercapacitor

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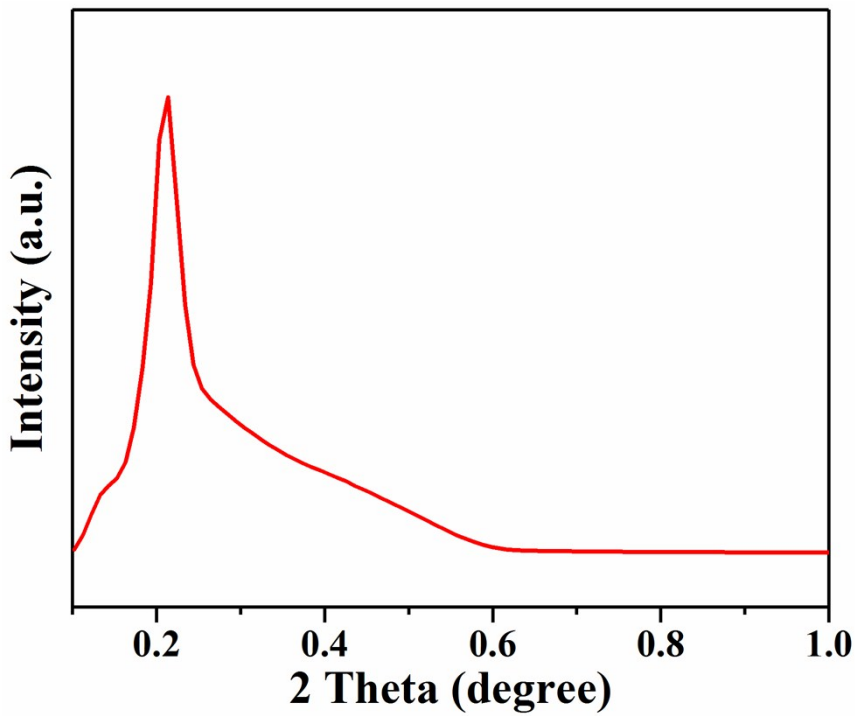

Figure S1. Small-angle XRD patterns of the representative sample N-IOC-0.27-900.

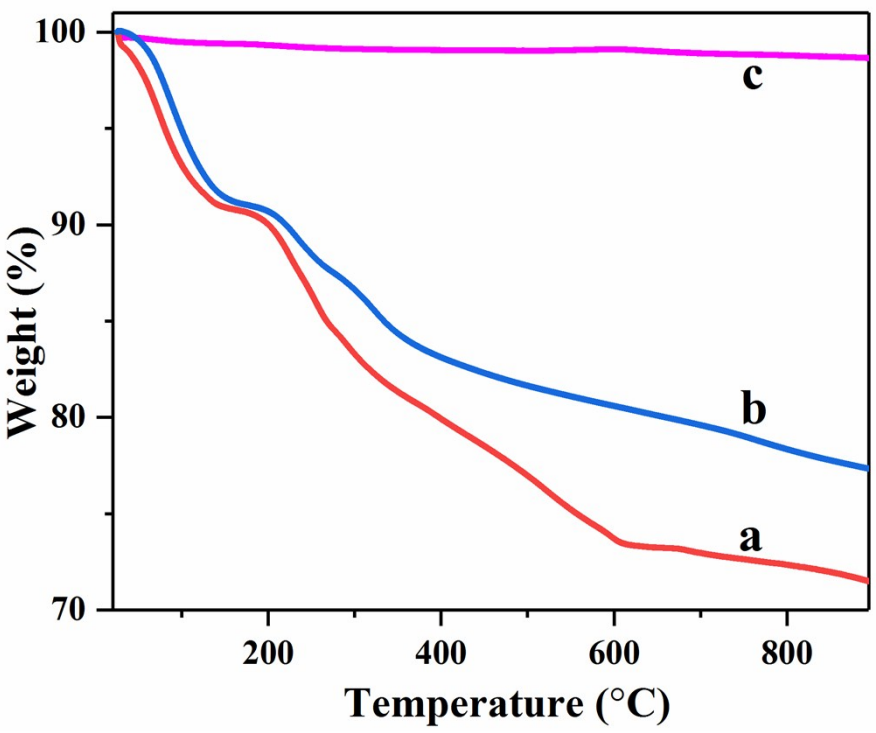

Figure S2. TG curves of intermediate products obtained during the synthesis process of the representative sample N-IOC-0.27-900, namely, the His-coated SiO_2@His composite before carbonization (a, b) conducted under flowing O_2 (a), and flowing N_2 (b), respectively and the carbonized SiO_2@N-IOC composite before silica removal (c).

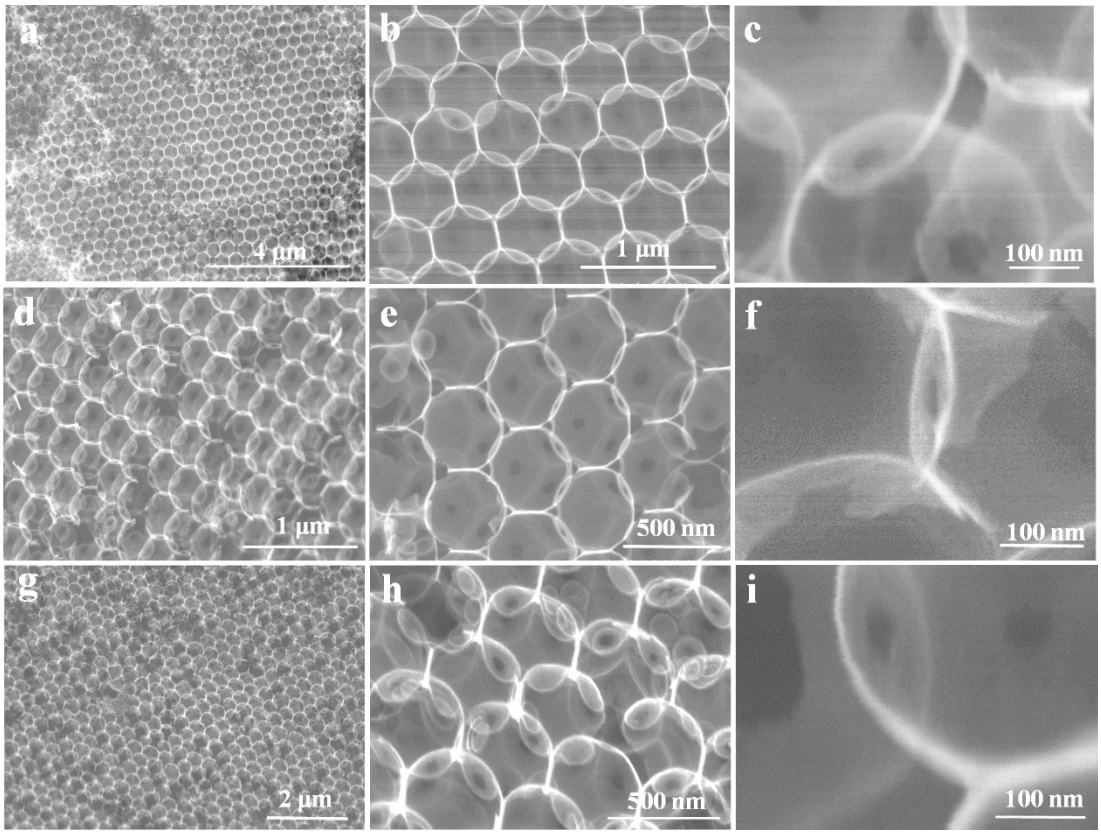

Figure S3. Different-magnification SEM images of the sample N-IOC-0.19-900 (a-c), N-IOC-0.27-900 (d-f), and N-IOC-0.33-900 (g-i), respectively, which were obtained at a fixed carbonization temperature of 900 ºC by using His solutions of different concentrations.

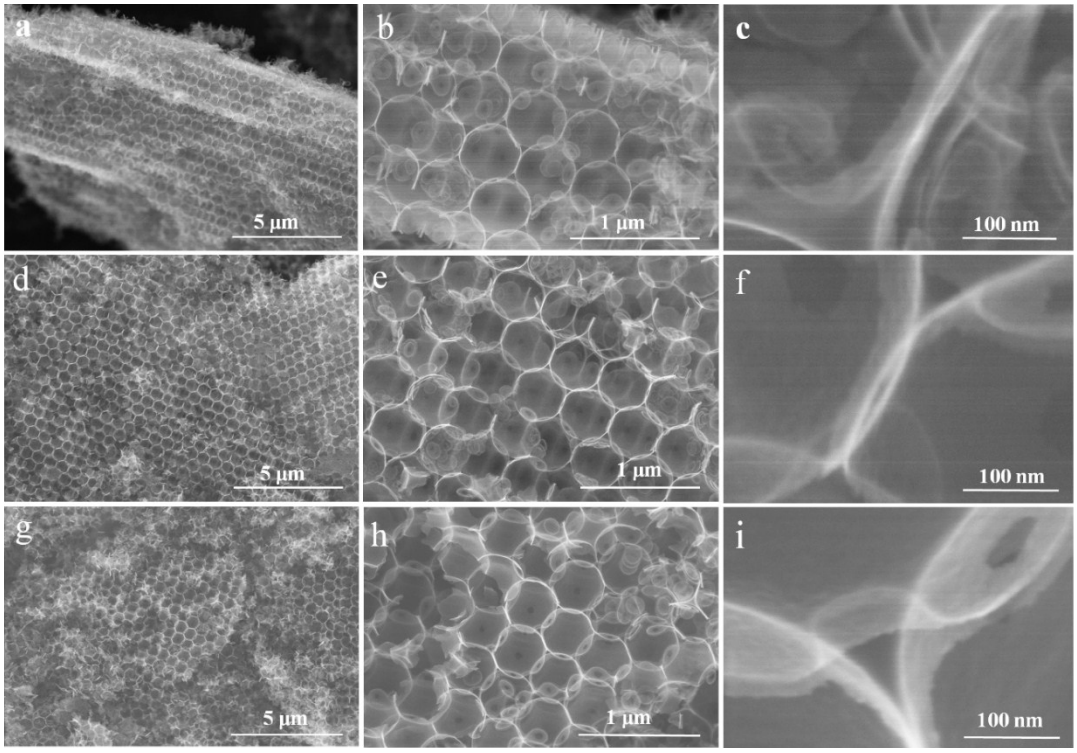

Figure S4. Different-magnification SEM images of the sample N-IOC-0.27-700 (a-c), N-IOC-0.27-800 (d-f), and N-IOC-0.27-1000 (g-i), respectively, which were obtained with a fixed His concentration of 0.27 g/mL by using different carbonization temperatures.

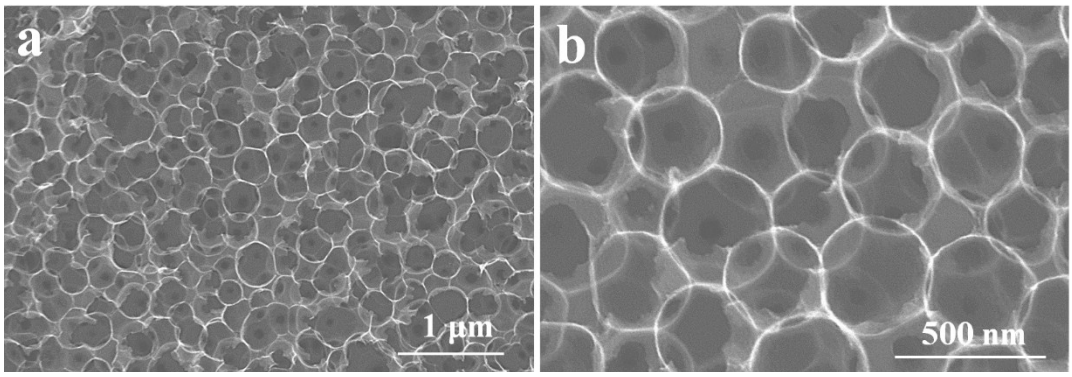

Figure S5. SEM images of the control sample N-HPC-900 obtained by using the same recipe as that for the synthesis of the N-IOCs but using a procedure of gravitational sedimentation.

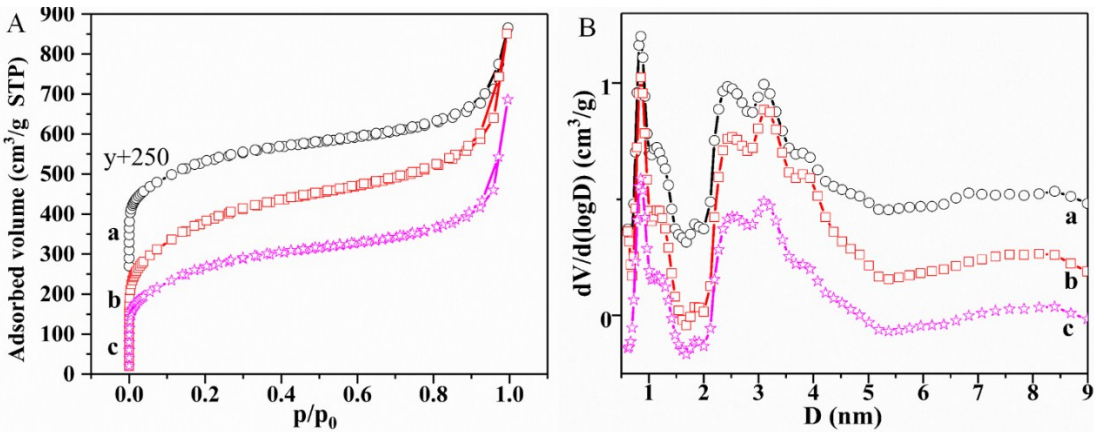

Figure S6. N_2 sorption isotherms (A), and the corresponding pore size distribution curves (B) of the sample N-IOC-0.19-900 (a), N-IOC-0.27-900 (b), and N-IOC-0.33-900 (c), respectively, which were obtained at a fixed carbonization temperature of 900 ºC by using different His concentrations.

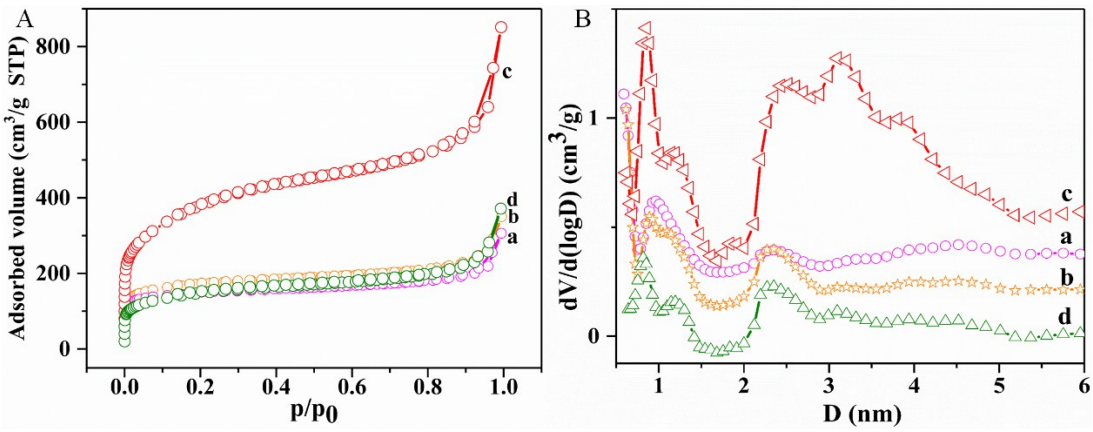

Figure S7. N_2 sorption isotherms (A) and the corresponding pore size distribution curves (B) of the sample N-IOC-0.27-700 (a), N-IOC-0.27-800 (b), N-IOC-0.27-900 (c), and N-IOC-0.27-1000 (d), respectively, which were obtained with a fixed His concentration of 0.27 g/mL by using different carbonization temperatures.

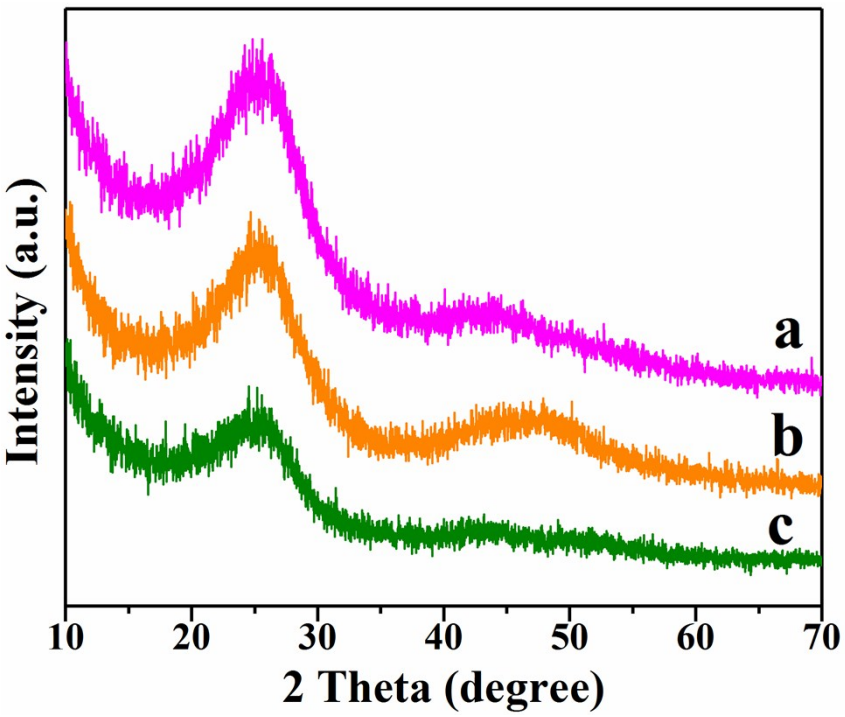

Figure S8. Wide-angle XRD patterns of the sample N-IOC-0.27-700 (a), N-IOC-0.27-800 (b), and N-IOC-0.27-1000 (c), respectively, which were obtained with a fixed His concentration of 0.27 g/mL at different carbonization temperatures.

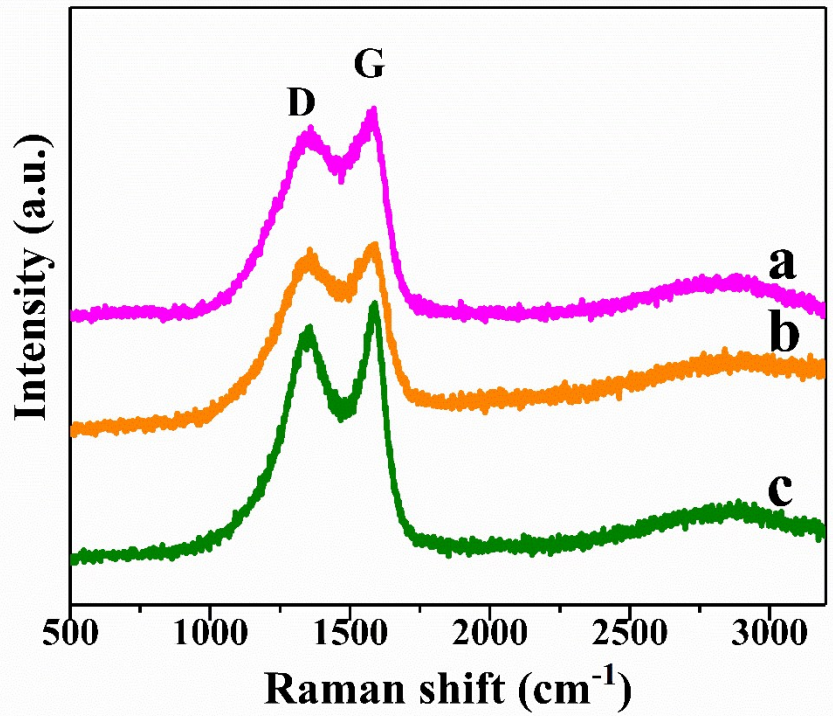

Figure S9. Raman spectra the sample N-IOC-0.27-700 (a), N-IOC-0.27-800 (b), and N-IOC-0.27-1000 (c), respectively, which were obtained with a fixed His concentration of 0.27 g/mL at different carbonization temperatures.

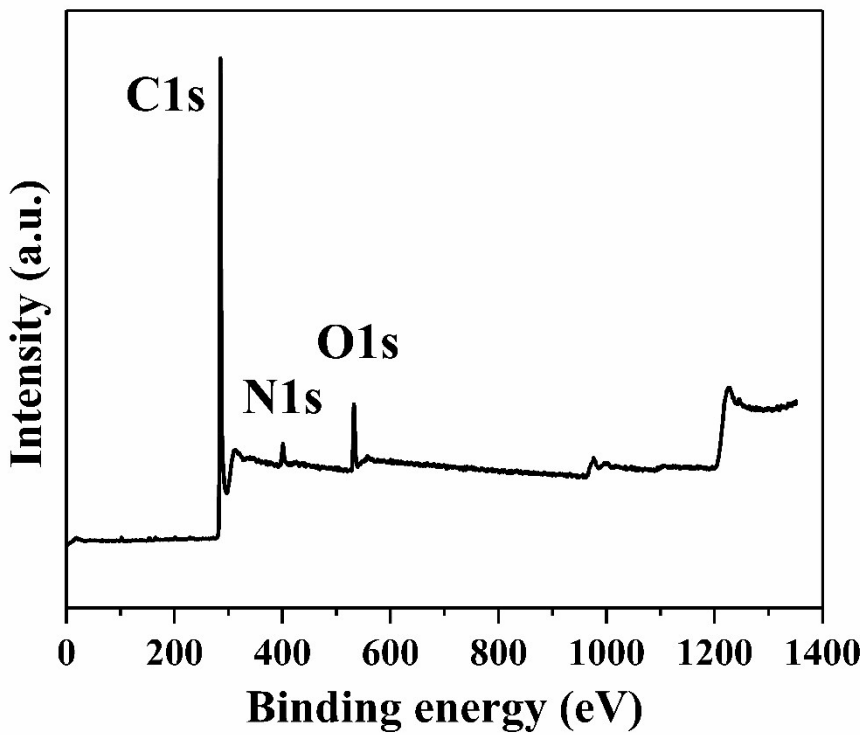

Figure S10. XPS survey spectrum of the representative sample N-IOC-0.27-900.

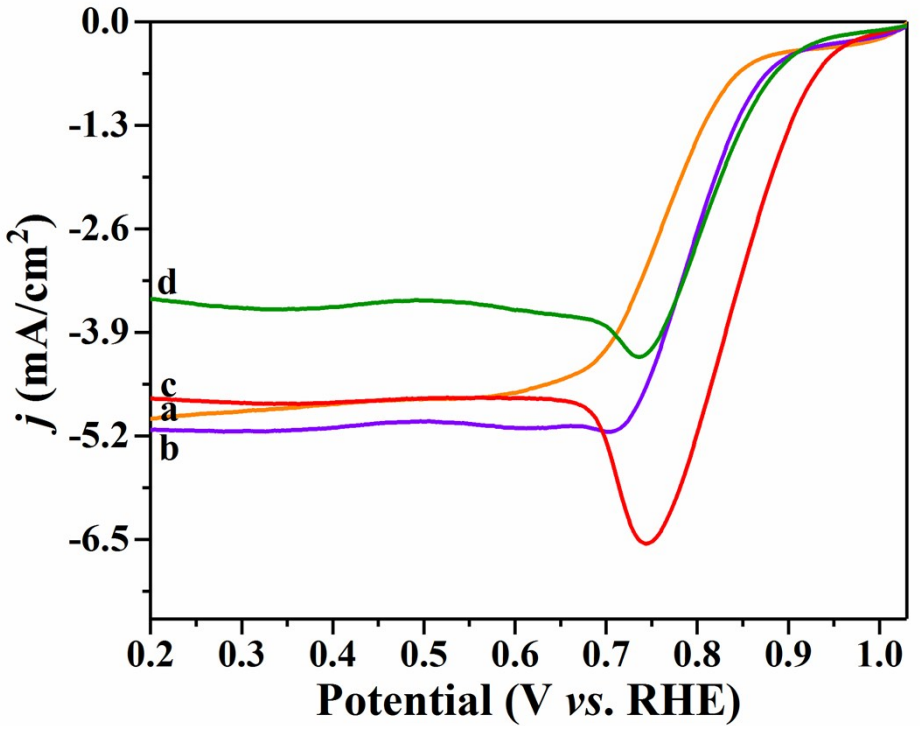

Figure S11. LSVs measured at a rotating speed of 1600 rpm under the O_2-saturated 0.10 M KOH electrolyte of the sample N-IOC-0.27-700 (a), N-IOC-0.27-800 (b), N-IOC-0.27-900 (c), and N-IOC-0.27-1000 (d), respectively, which were obtained with a fixed His concentration of 0.27 g/mL at different carbonization temperatures.

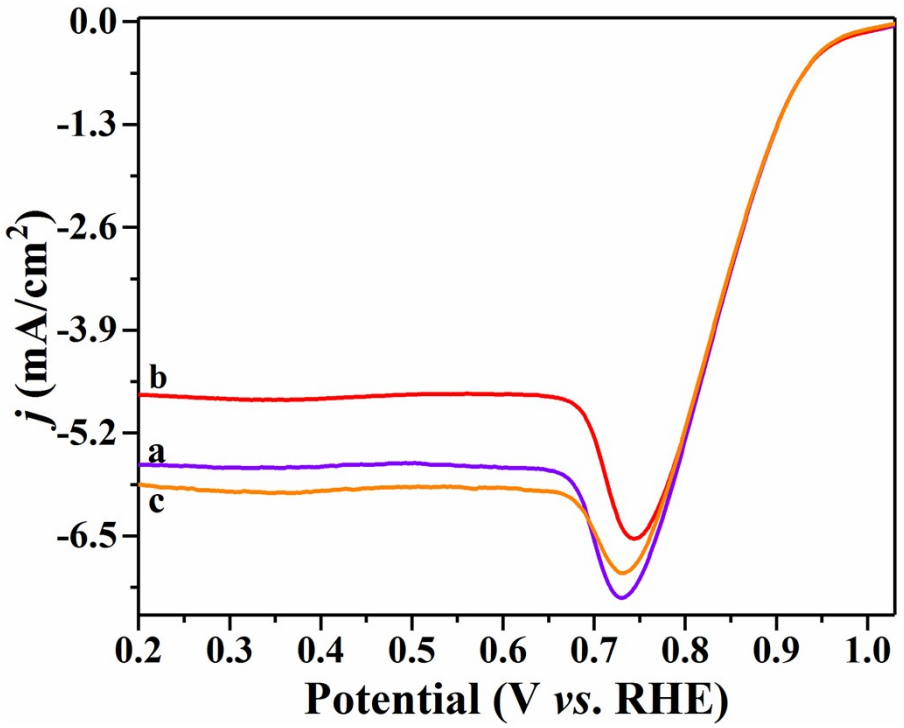

Figure S12. LSVs measured at a rotating speed of 1600 rpm under the O_2-saturated 0.10 M KOH electrolyte of the sample N-IOC-0.19-900 (a), N-IOC-0.27-900 (b), N-IOC-0.33-900 (c), respectively, which were obtained with a fixed temperature of 900 ºC by using different His concentrations.

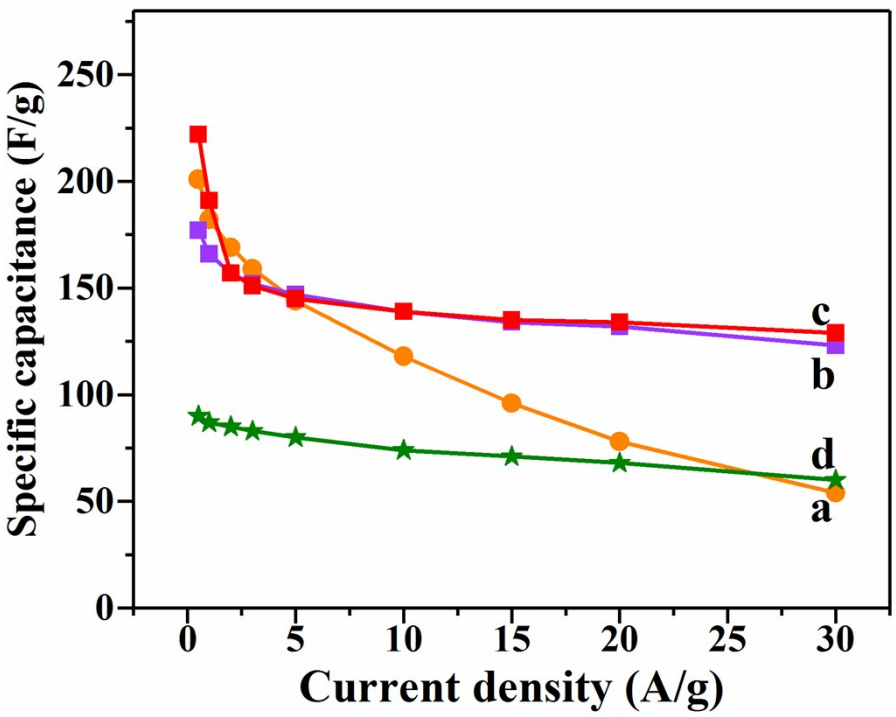

Figure S13. Specific capacitances at different current densities of the sample N-IOC-0.27-700 (a), N-IOC-0.27-800 (b), N-IOC-0.27-900 (c), and N-IOC-0.27-1000 (d), respectively, which were obtained with a fixed His concentration of 0.27 g/mL at different carbonization temperatures.

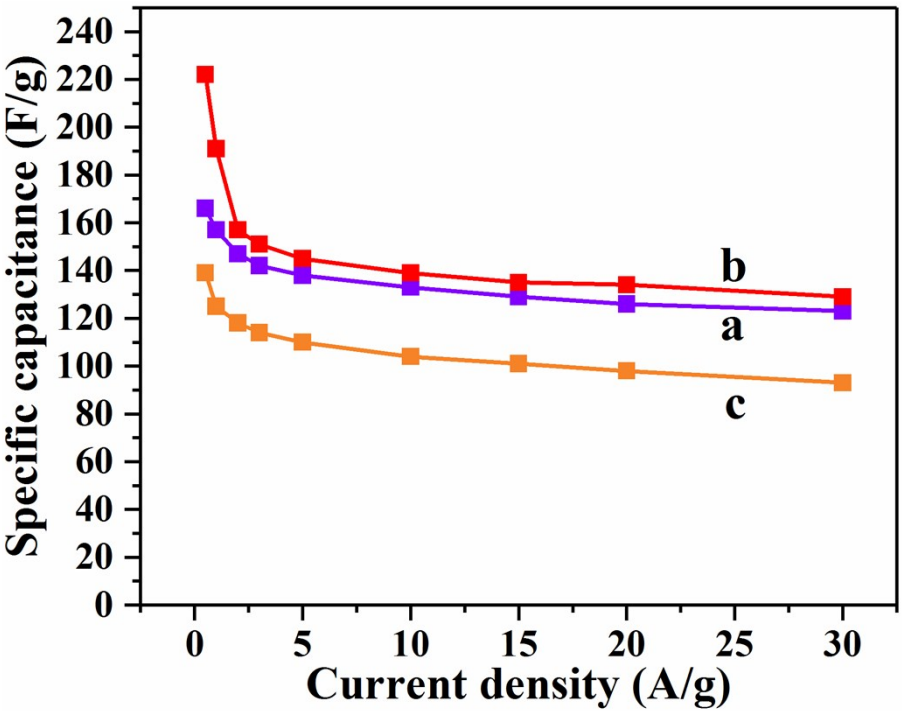

Figure S14. Specific capacitances at different current densities of the sample N-IOC-0.19-900 (a), N-IOC-0.27-900 (b), N-IOC-0.33-900 (c), respectively, which were obtained with a fixed temperature of 900 ºC by using different His concentrations.

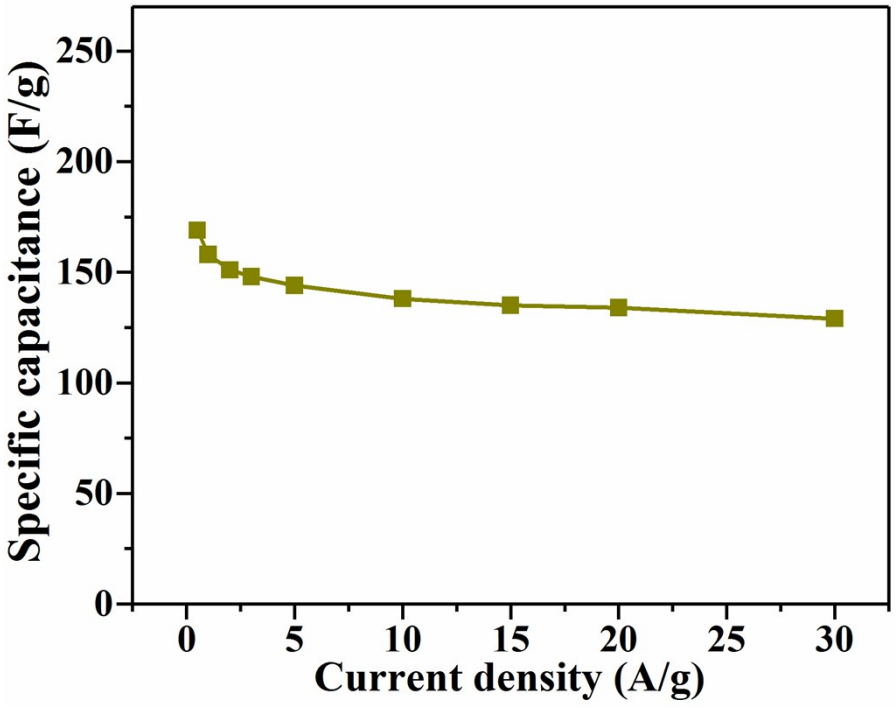

Figure S15. Specific capacitances at different current densities of the control sample N-HPC-900 obtained by using the same recipe as that for the synthesis of the N-IOC-0.27-900, but using gravitational sedimentation for the templating process.