The specific capacitance of these samples from galvanostatic charge/discharge curves are calculated as

\[ Cs = \frac{I \Delta t}{m \Delta V} \]

where \( I \) is the constant current and \( m \) is the total mass for both carbon electrodes, \( \Delta t \) is the discharge time and \( \Delta V \) is the voltage change during the discharge process.

The specific capacitance derived from cyclic voltammograms as

\[ Cs = \frac{A}{f \cdot \Delta V \cdot m} \]

where \( A \) is the integral areas of the cyclic voltammogram loops, \( f \) is the scan rate, \( \Delta V \) is the voltage window, and \( m \) is the mass of the electrode.

The electron transfer numbers at these three electrodes can be derived from the equation of Koutechy-Levich plot \(^1,^2\) showing blow:
in which \( j \) is the current density at appointed voltage, \( j_k \) is the kinetic current and \( \omega \) is the electrode rotating rate (rpm). The parameter \( B \) at different applied voltage could be obtained from the slope of the K-L plots in Figure S7. Meanwhile, the electron transfer number at different voltage is connected with parameter \( B \) according to the Levich equation as following in the alkaline aqueous solution \(^2\):

\[
B = 0.2nF(D_{O_2})^{2/3}v^{-1/6}C_{O_2}
\]

where \( n \) represents the overall electron transfer number per oxygen molecule, \( F \) is the Faraday constant with the value of 96485 C mol\(^{-1}\), \( D_{O_2} \) is the diffusion coefficient of \( O_2 \) in 0.1 M KOH (1.9 \( \times \) \( 10^{-5} \) cm\(^2\) s\(^{-1}\)), \( v \) is the kinetic viscosity (0.01 cm\(^2\) s\(^{-1}\)), and \( C_{O_2} \) is the bulk concentration of \( O_2 \) (1.2 \( \times \) \( 10^{-6} \) mol cm\(^{-3}\)). The constant 0.2 is adopted when the rotation speed is expressed in rpm in alkaline aqueous solution.

Figure S1. Photo image of the gel-like GO sediment before and after freezing.
Figure S2. Photo image of the frozen GO monolith before thermal treatment (a) and the as-prepared porous graphene monolith after thermal treatment (b)
Figure S3. Magnified SEM images of B-G 600 (a), B-G 800 (b), and STEM image of B-G 800 (c).
Figure S4. C1s spectrum of (a) B-G 600 and (b) B-G 800.

Figure S5. Cyclic voltammetry (CV) curves of 3-D porous graphene framework in a three electrode system in 2 M H$_2$SO$_4$ solution at the scan rate of 10, 30, 50, and 100 mV s$^{-1}$. (a) B-G 400, (b) B-G 600, and (c) B-G 800.
Figure S6. Linear sweep voltammetry curves of ORR at several designed rotation speed in the O$_2$-saturated 0.1 M KOH solution with the scan rate of 10 mV s$^{-1}$. a) B-G 400, (b) B-G 600, and (c) B-G 800.
Figure S7. K-L plots of ORR at different applied potential of B-G 400 (a), B-G 600 (b), and B-G 800 (c).

References:
