

Supplementary Information

Holey Graphene Synthesized by Electrochemical Exfoliation for High-Performance Flexible Micro-supercapacitors

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1. Gas detection experiment

50ml gases were collected by a syringe and was detected by a Thermal Conductivity Detector (TCD), the result is shown in **Fig. S1**. Gases including H₂, CO₂, O₂, CO are detected. Further, the gases were guided into the potassium permanganate solution for 2 h. The color of potassium permanganate solution gradually fades (**Fig. S2**), revealing the existence of SO₂.

2. BET experiment

The N₂ adsorption–desorption isotherms of the FHG were recorded at 77 K using an ASiQWin (Quantachrome), and the specific area was calculated by the Brunauer–Ennett–Teller (BET) method with a multi-molecular layer adsorption model. The BET area and

the total pore volume of the FHG were determined to be $42.4 \text{ m}^2 \text{ g}^{-1}$ and $0.12 \text{ cm}^3 \text{ g}^{-1}$ by the nitrogen adsorption-desorption isotherm plot, respectively (**Fig. S6a**), and the pore-size distribution curve (**Fig. S6b**) shows a sharp peak at 2.2 nm.

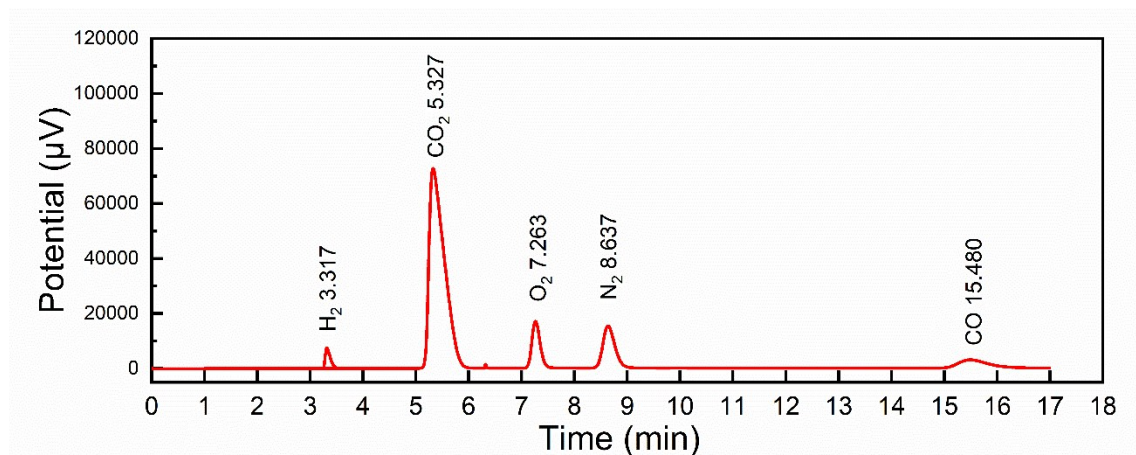


Fig. S1. TCD spectra of the gases generated in the exfoliation process.

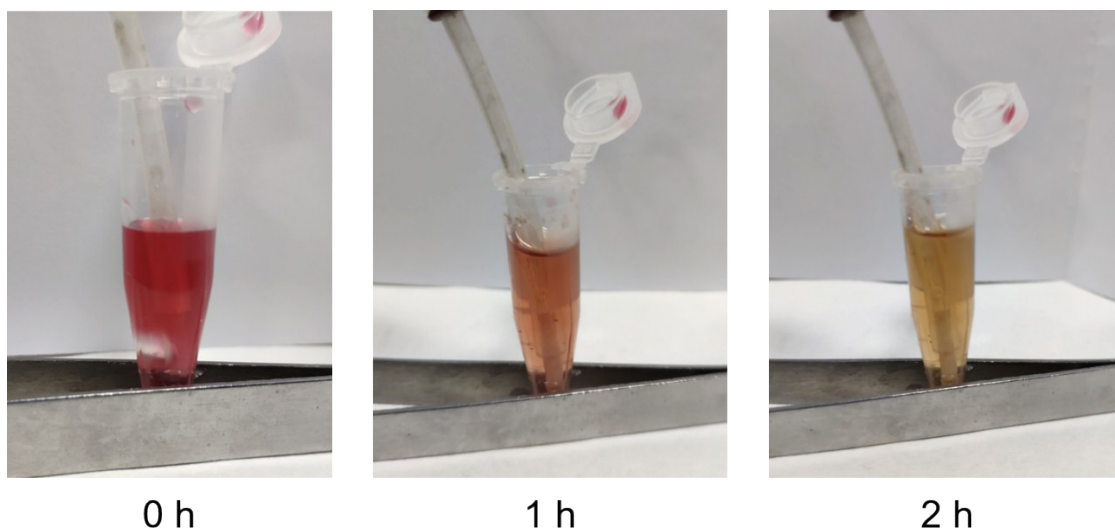


Fig. S2. The color of potassium permanganate solution changes with the ventilation time.



Before exfoliation



After exfoliation

Fig. S3. The total weight of the initial graphite foil (788mg), and the weight of obtained FHG powder (629mg).

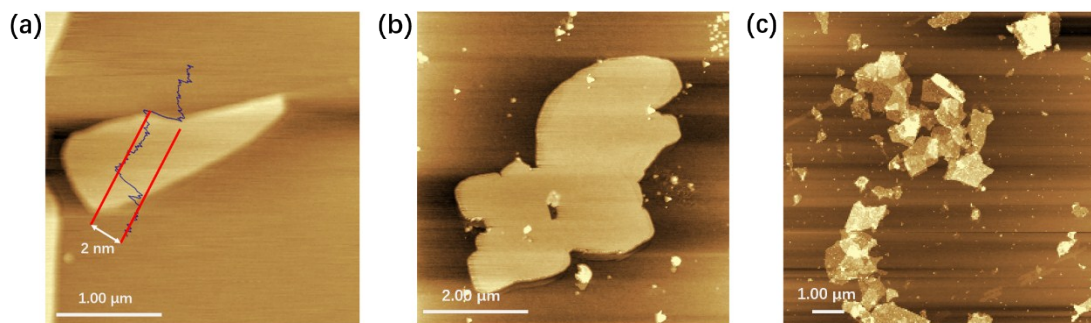


Fig. S4. AFM images of FHG nanosheets.

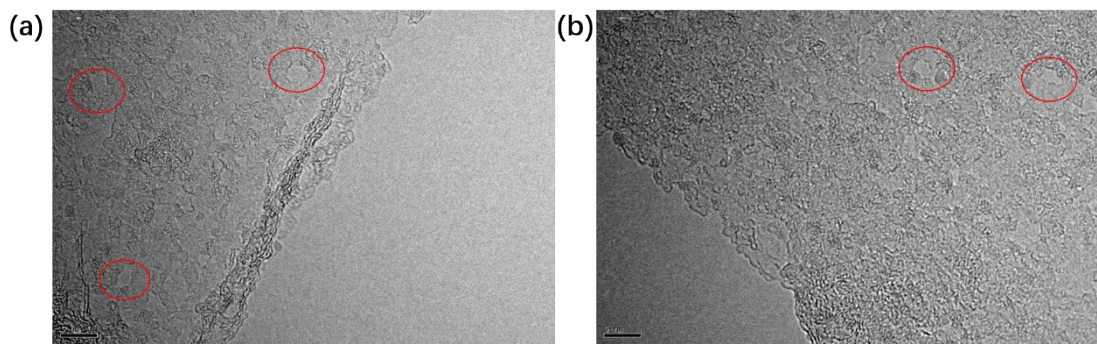


Fig. S5. HRTEM images of FHG nanosheets. The red circles mark the holes.

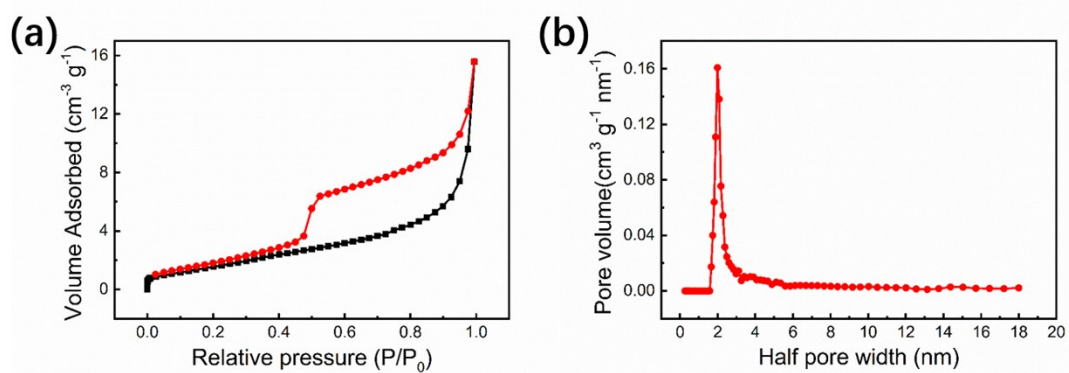


Fig. S6. (a) N_2 adsorption–desorption isotherms and (b) pore size distribution of FHG film.

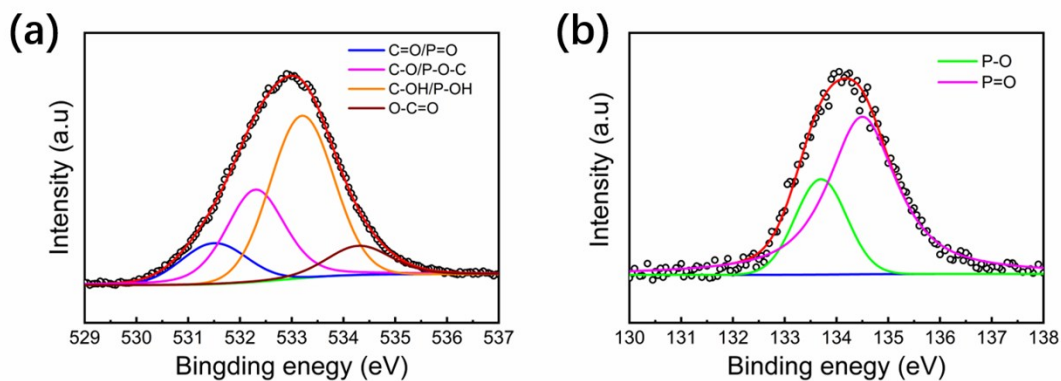


Fig. S7. (a) XPS $O1s$ spectra and (b) $P2p$ spectra of FHG-2 film.

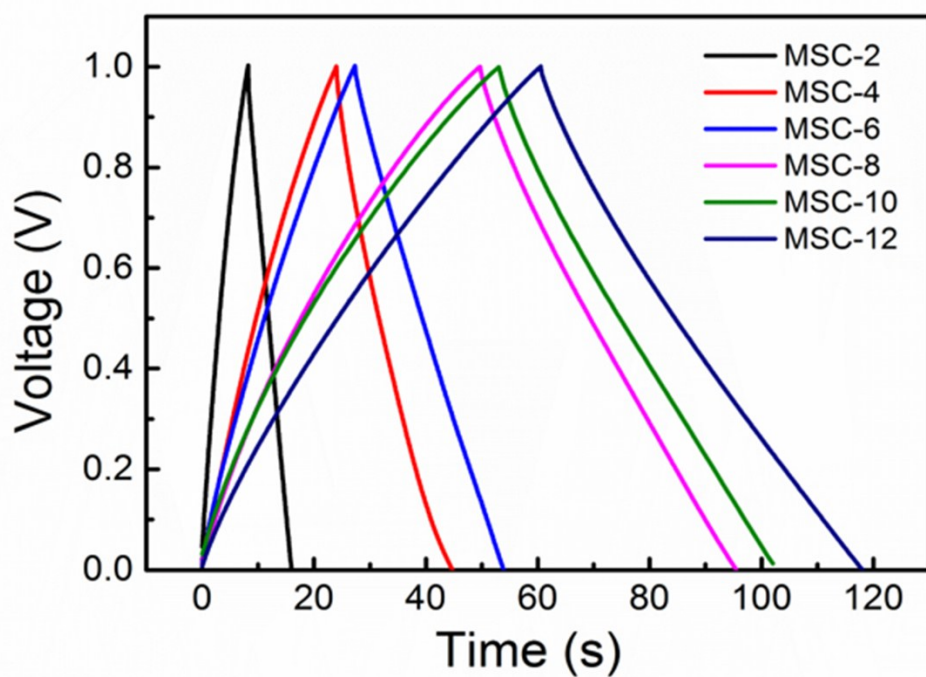


Fig. S8. GCD curves of different thickness of MSCs at current density of 0.1 mA cm⁻².

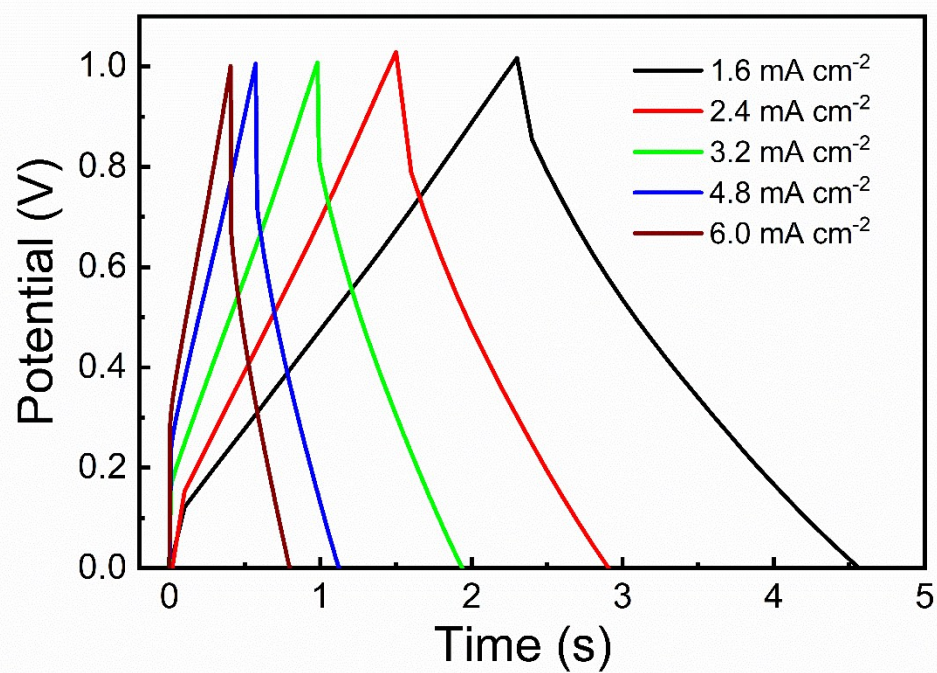


Fig. S9. GCD curves of MSC-12 at current densities ranging from 1.6 mA cm⁻² to 6 mA cm⁻²