Electronic Supplementary Information

One-pot Sonochemical Preparation of Fluorographene and Selective Tuning Its Fluorine Coverage

Peiwei Gong\textsuperscript{ab}, Zhaofeng Wang\textsuperscript{a}, Jinqing Wang\textsuperscript{*a}, Honggang Wang\textsuperscript{a}, Zhangpeng Li\textsuperscript{ab}, Zengjie Fan\textsuperscript{ab}, Ye Xu\textsuperscript{ab}, Xiuxun Han\textsuperscript{*a}, and Shengrong Yang\textsuperscript{a}

\textsuperscript{a} State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou, 730000, P. R. China.

\textsuperscript{b} Graduate University of Chinese Academy of Sciences, Beijing, 100080, P. R. China.

\* Corresponding authors,
jqwang@licp.cas.cn (J. Wang); xxhan@licp.cas.cn (X. Han)

Fax: +86 931 8277088

Tel.: +86 931 4968076
1. **XPS spectra of N1s for all the samples**

High-resolution XPS spectra of N1s serve as a probe to monitor the residual of NMP in FG. The results indicate that NMP can be successfully and easily rinsed away by water, guaranteeing the high purity of the obtained FG.

![Fig. S1 High-resolution XPS spectra of N1s for the samples in the experiment.](image-url)
2. Electronic structure calculation of FG by Density Functional Theory and DRS of the samples

Fig. S2 Calculated band structure and related density of states (DOS) of FG, along lines connecting the high-symmetry points G, K, and M. The energy reference level has been chosen to be the valence band maximum. (a) C/F = 1, $E_{\text{bandgap}} = 2.953$ eV; (b) C/F = 4, $E_{\text{bandgap}} = 2.785$ eV; (c) the DRS of the samples (BaSO$_4$ as reference), the optical bandgap of FG is 3.0 eV for 0 h and 2.69 eV for 100 h.
3. **Comparative experiment**

Samples that underwent the same reflux procedure yet without sonication were prepared under the same conditions. Both UV-vis and FTIR spectra indicate that NMP has little to do with fluorine loss.

**Fig. S3** UV-vis absorption (a) and FTIR (b) spectra of the comparative samples obtained at different reaction times of 0, 16, 32 and 100 h while without sonication.
4. Stability of FG in NMP

FG that was obtained after 32 h of sonication and dispersed in NMP without any additional stabilizer or modifier shows good stability even after standing for 3 weeks.

**Fig. S4** Digital images of FG dispersed in NMP. Top: dispersions without stand after sonication. Bottom: dispersions being stayed for 3 weeks after sonication.