Electronic Supplementary Material (ESI) for RSC Advances.

Large-Scale Synthesis of High-Quality Graphene Sheets by Improved Alternating Current Arc-discharge Method

Xiaohui Wu, Yang Liu, Hao Yang, and Zujin Shi*

Beijing National Laboratory for Molecular Sciences, State Key Lab of Rare Earth Materials Chemistry and Applications, College of Chemistry and Molecular Engineering, Peking University, Beijing 100871, China

Table S1. BET surface area of samples synthesized under different buffer gases

Sample	AC-N1/H3	AC-N1/H2	AC-N1/H1	AC-N
BET surface area (m^2 g^{-1})	119.50	125.39	143.72	144.72

Table S2. Elemental analysis of AC-N1/H2

	N	C	H
wt%	0.41	97.23	0.30
at%	0.64	93.34	3.51

\

Table S3. Elemental analysis of AC-N1/H2

Sample	N / at%	C / at%	O / at%
AC-N1/H1	0.78	95.88	3.34
AC-N1/H2	0.68	96.99	2.33
AC-N1/H3	0.61	96.62	2.77

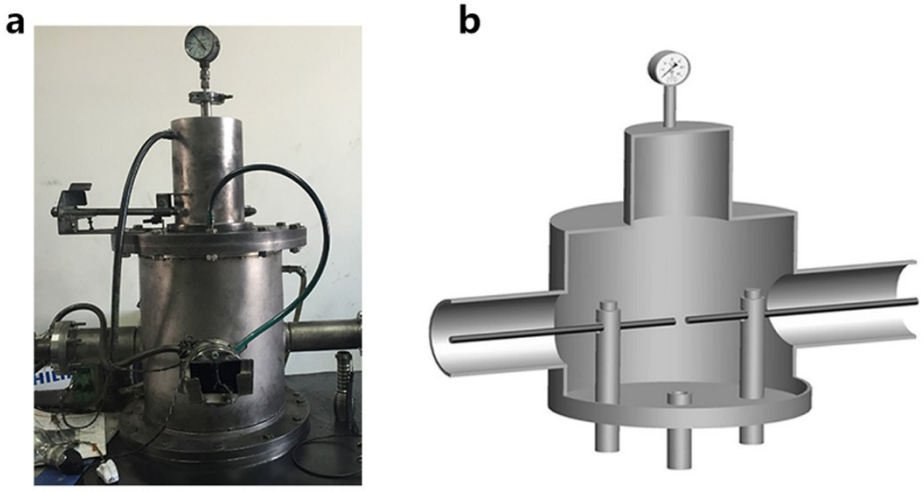


Fig.S1. (a) The photograph of arc furnace and (b) its schematic diagram

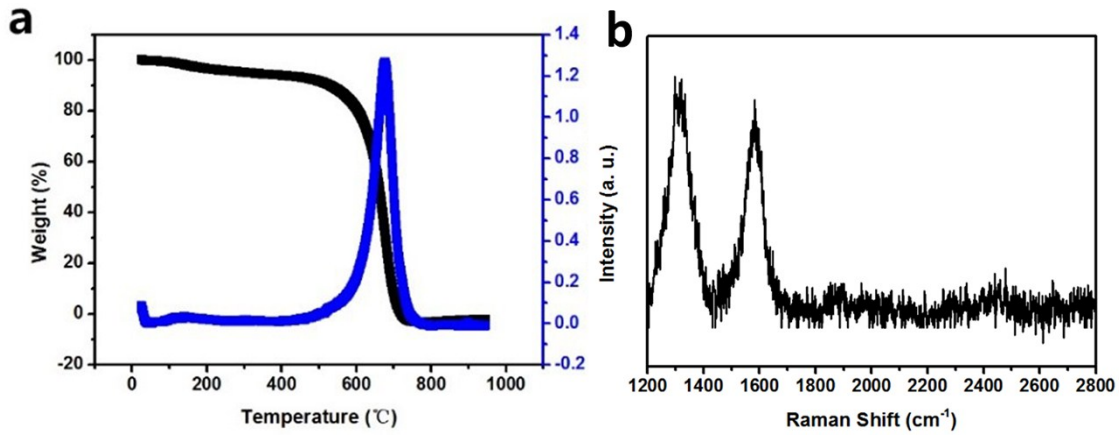
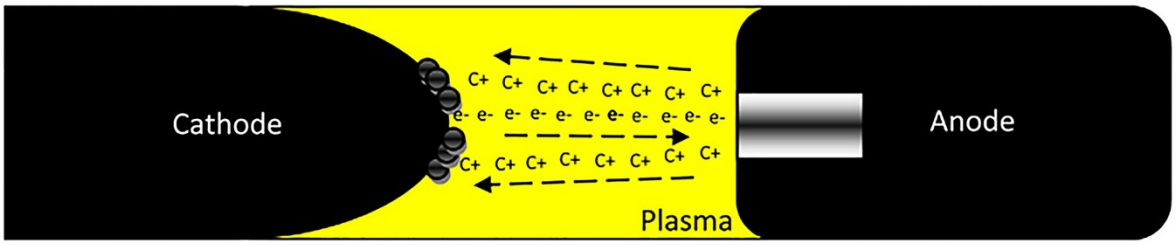
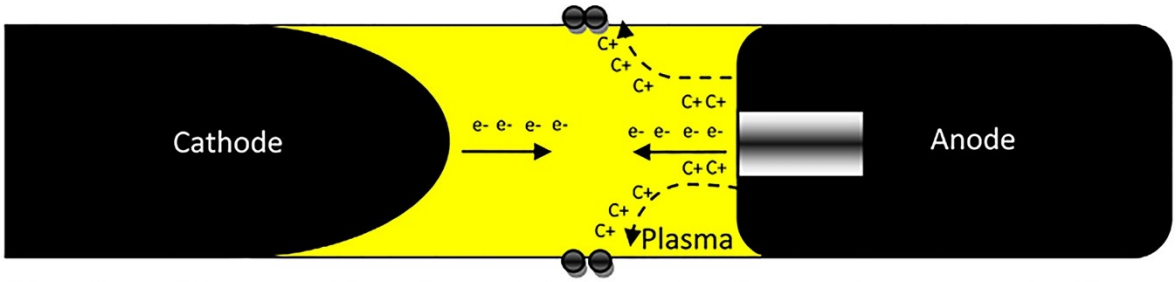


Fig. S2. (a) TGA curve of AC-N1/H2 after annealing at 400 °C for 1 h; (b) Raman spectra of AC-N.



(a) DC Arc Discharge: Continuous movement of ions and electrons in the plasma between the electrodes. Continuous Deposition obtained at Cathode



(b) AC Arc Discharge: The polarity of the electrodes changes after every cycle. Thus electrons are discharged from both side and results in C+ ions from anode flying away from the plasma. The deposition is obtained the reactor chamber walls. Lesser deposition obtained compared to DC and Pulsed Discharge.

Fig. S3. Schematics showing the mechanisms using different power supplies. (From ref. 16)

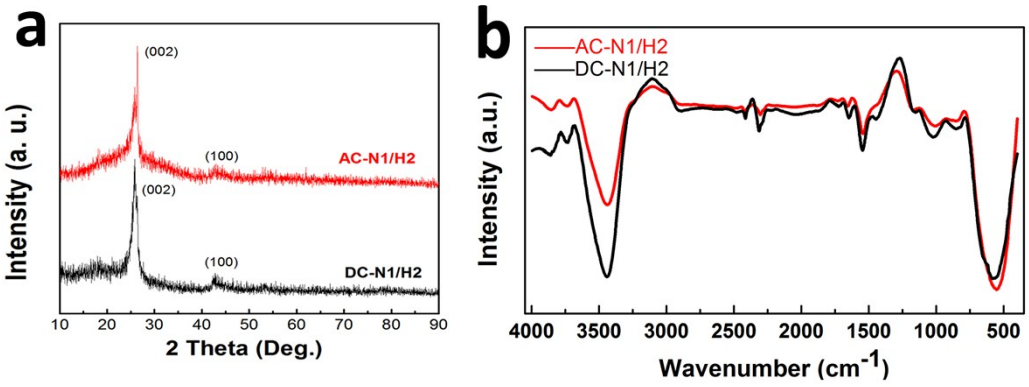


Fig. S4. (a) XRD pattern and (b) FT-IR spectra of AC-N1/H2 and DC-N1/H2.

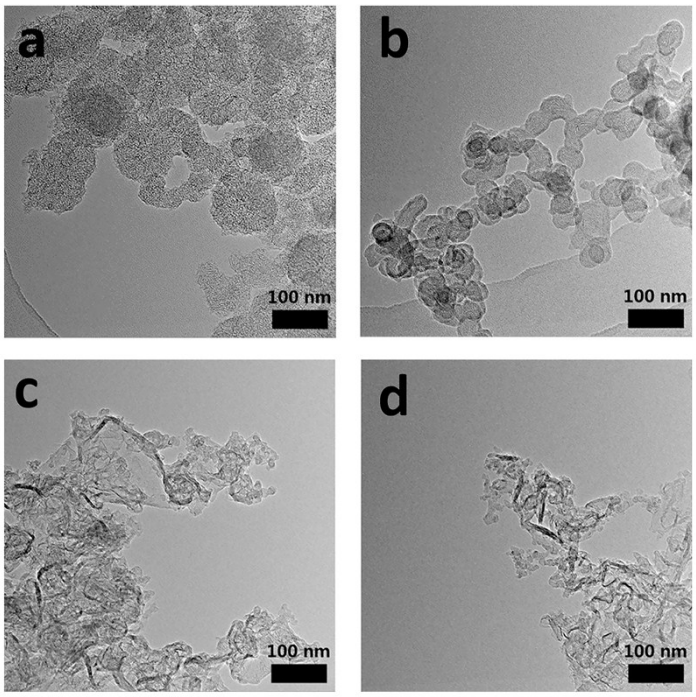


Fig. S5. TEM micrographs of (b) AC-N and (b) DC-N; (c) AC-H and (d) DC-H.

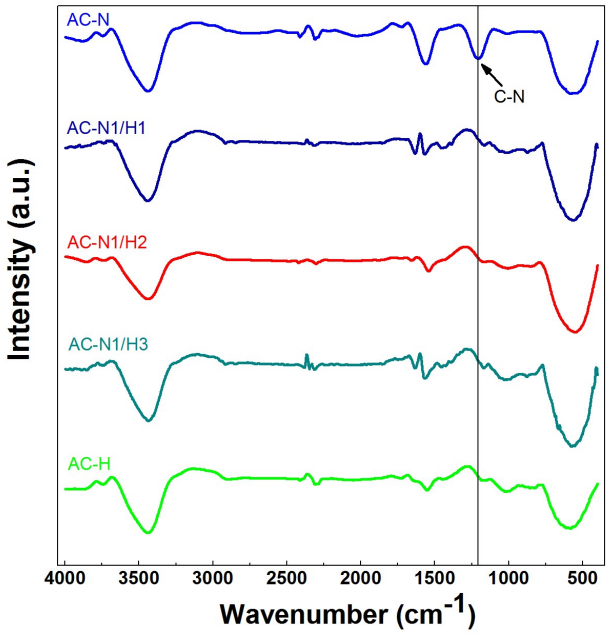


Fig. S6. FT-IR spectra of AC-N, AC-N1/H1, AC-N2/H2, AC-N1/H3 and AC-H.