

Supporting Information

for

Experimental studies of methane adsorption on activated carbon and 3D graphene sheets

Ziwen Zhu*, Muyuan Zhan

Institute of Marine Engineering, Jimei University, Xiamen 361021, China

S1. BET Specific Surface Area

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The BET transformation is calculated as [1]:

$$y = \frac{1}{Q(\rho^0 / \rho - 1)} \quad (\text{S1-1})$$

A least-squares fit is performed on the (P_{rel}, y) . The following are calculated:

- Slope ($S \text{ cm}^3/\text{g STP}$)
- Y-intercept ($y_0 \text{ cm}^3/\text{g STP}$)
- Uncertainty of the slope ($u(s) \text{ cm}^3/\text{g STP}$)
- Uncertainty of the Y-intercept ($u(y_0) \text{ cm}^3/\text{g STP}$)
- Correlation coefficient

Using the results of the above calculations, the following can be calculated:

BET Surface Area (m^2/g):

$$A_s = \frac{A_m N_A}{V_m (s + y_0)} \times 10^{-18} \text{ m}^2 / \text{nm}^2 \quad (\text{S1-2})$$

BET C value:

$$C = s / y_0 - 1 \quad (\text{S1-3})$$

Quality of the Monolayer ($\text{cm}^3/\text{g STP}$):

$$Q_m = 1 / C y_0 = \frac{1}{s + y_0} \quad (\text{S1-4})$$

Error of the BET Surface Area (m^2/g):

$$u(A_s) = \frac{\sqrt{u^2(s) + u^2(y_0)}}{s + y_0} \quad (\text{S1-5})$$

The graphical isotherm allows us to specify the data used in the BET model by sliding the calculation bars to define the range by 3Flex Surface Characterization Analyzer. The process in detail as listed below:

Activated Carbon (AC)

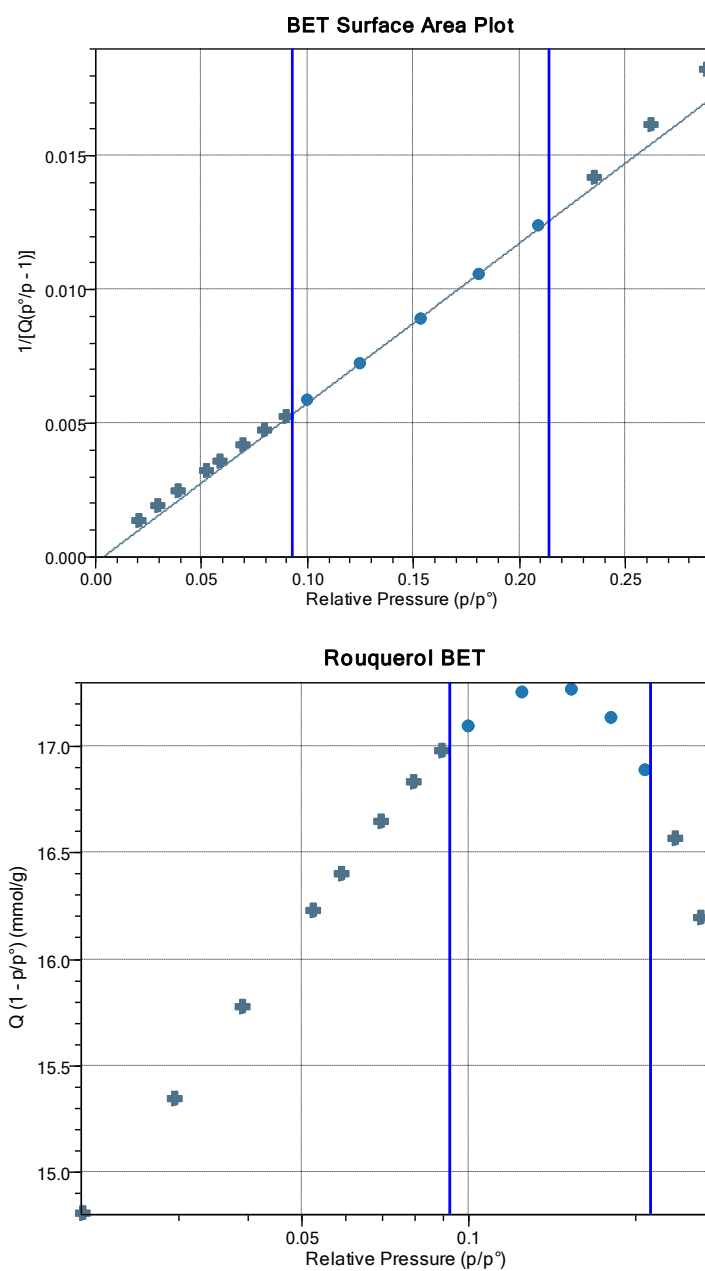


Figure S1. BET surface Area plot for AC

Table S1 The parameters of BET specific surface area for AC

Summary	
BET surface area	$1,637.3579 \pm 28.1011 \text{ m}^2/\text{g}$
Slope	$0.05979 \pm 0.00101 \text{ g/mmol}$
Y-intercept	$-0.00020 \pm 0.00016 \text{ g/mmol}$
C	-292.762478
Qm	16.78324 mmol/g
Correlation coefficient	0.9995722
Molecular cross-sectional area	0.1620 nm^2

3D graphene materials(3D-GS)

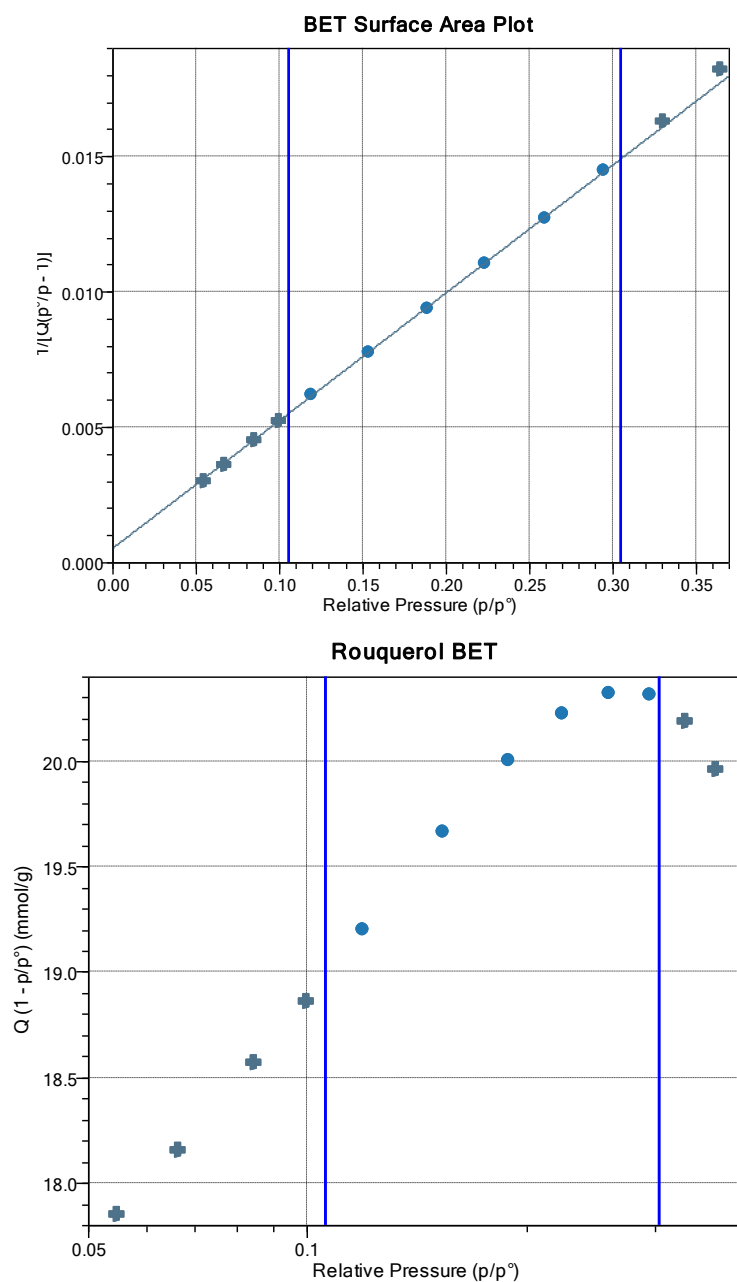


Figure S2. BET surface Area plot for 3D-GS

Table S2 The parameters of BET specific surface area for 3D-GS

Summary	
BET surface area	2,045.0693 ± 12.5727 m ² /g
Slope	0.04715 ± 0.00029 g/mmol
Y-intercept	0.00056 ± 0.00006 g/mmol
C	85.448225
Qm	20.96236 mmol/g
Correlation coefficient	0.9999260
Molecular cross-sectional area	0.1620 nm ²

REFERENCES

[1] Brunauer, S.; Emmett, P.H.; and Teller, E., J. Adsorption of gases in multimolecular layers. *Am. Chem. Soc.* 1938, 60: 309-319.