

*Electronic Supplementary Information*

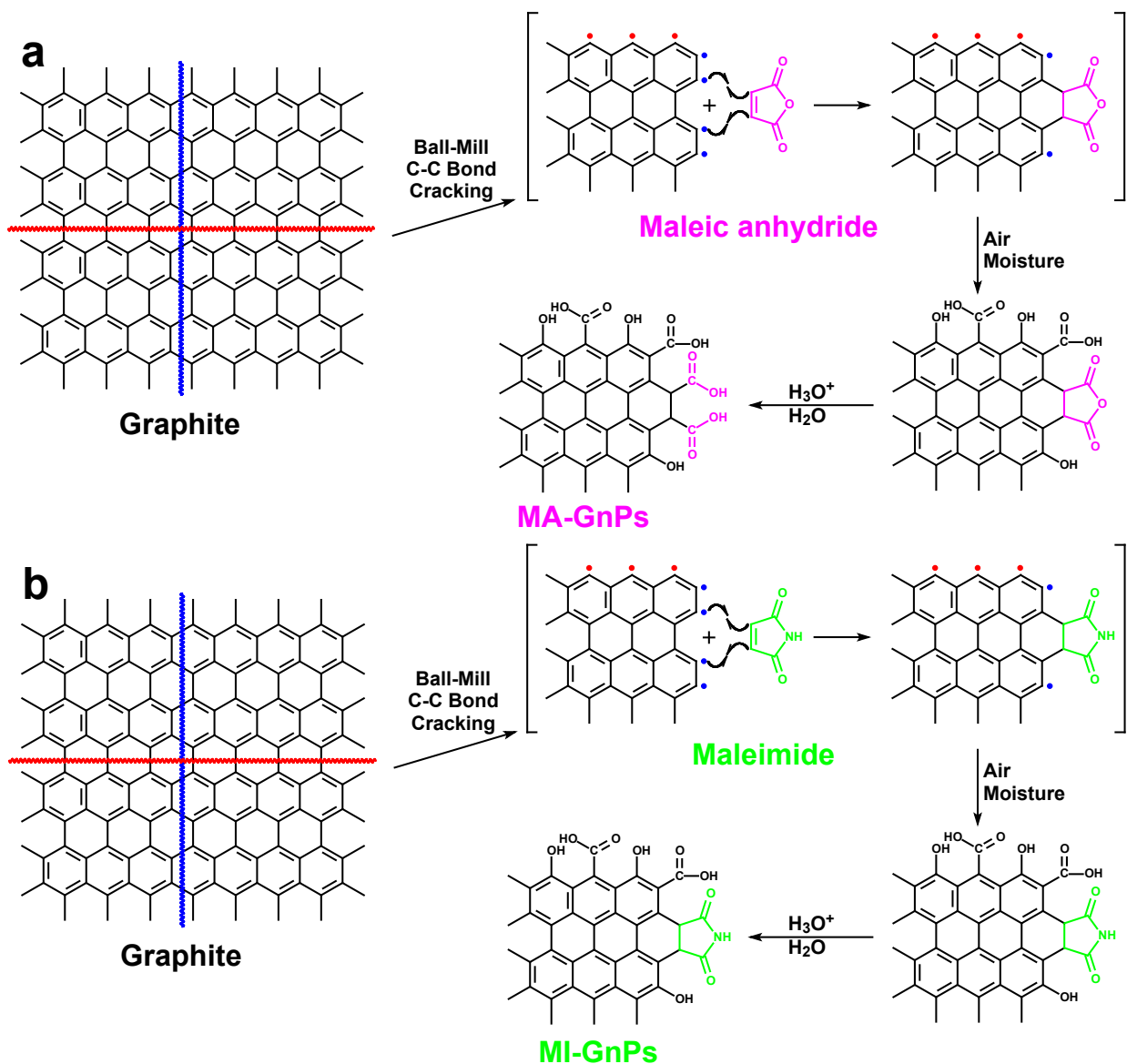
# Mechanochemically Driven Solid-State Diels-Alder Reaction of Graphite into Graphene Nanoplatelets

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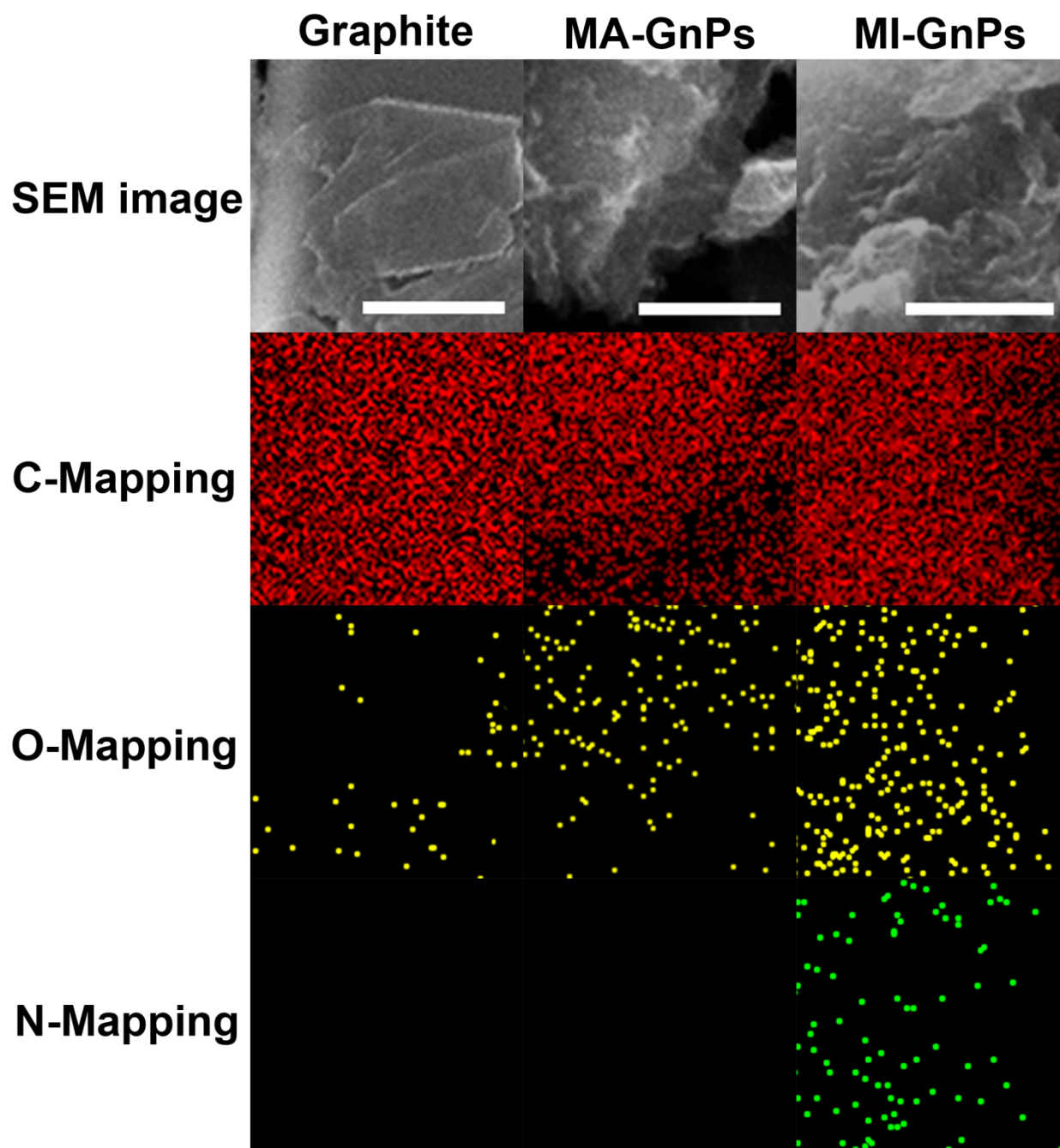
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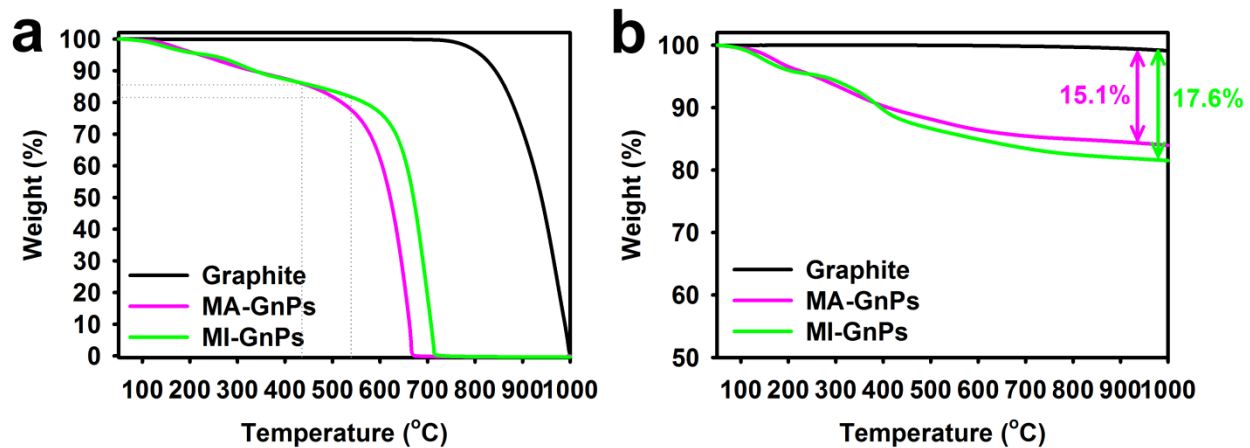
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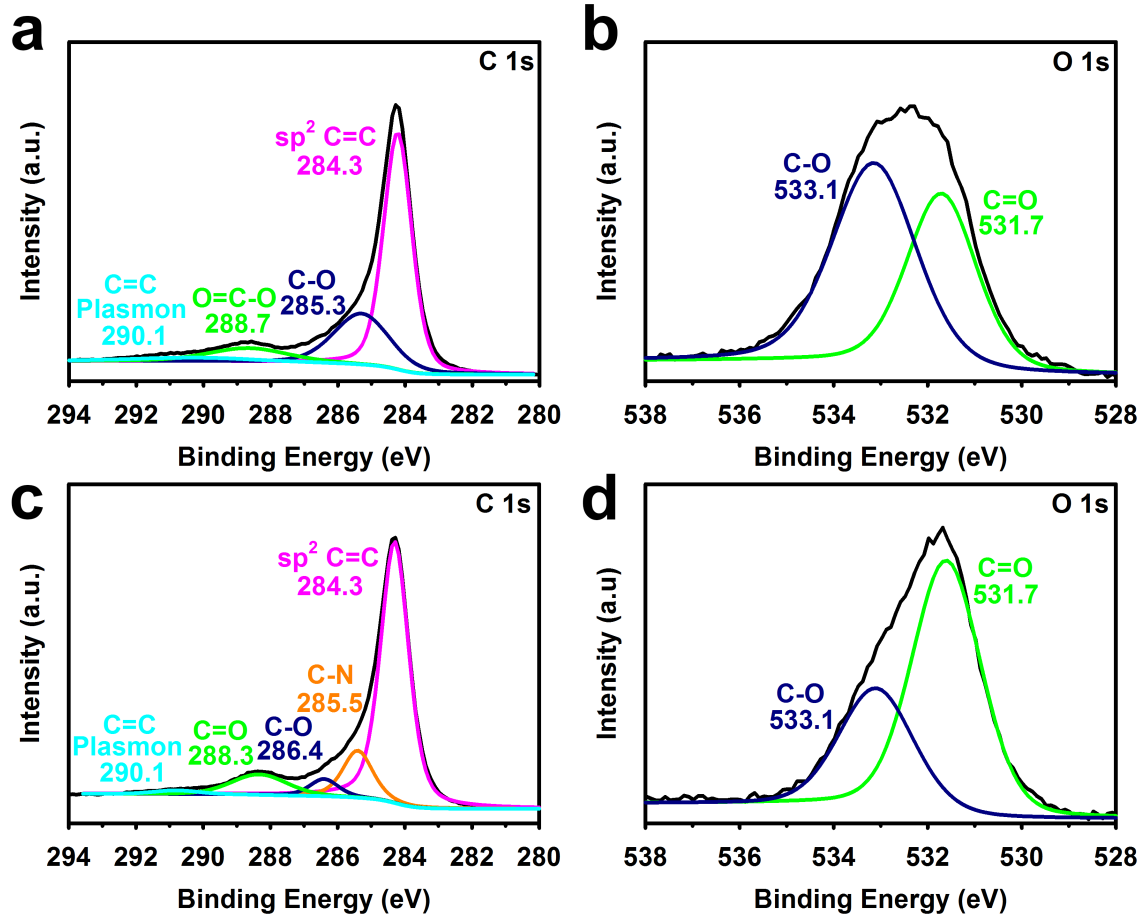
**Figure S1.** Proposed mechanism for the edge-selective functionalization of graphite by mechanochemical cracking of graphitic C-C bonds in the presence of maleic anhydride (MA) or maleimide (MI) to yield: (a) MA-GnPs; (b) MI-GnPs, respectively. The graphitic structure are simplified and idealized for clarity.



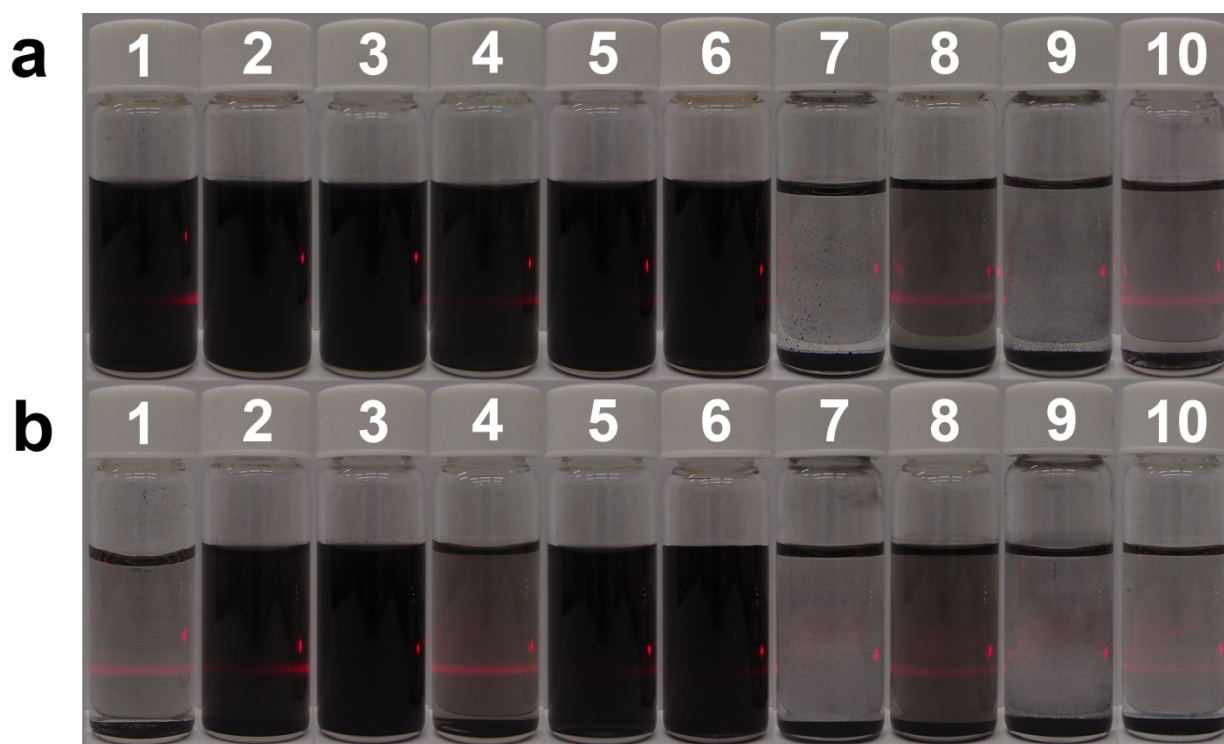
**Figure S2.** SEM images and their corresponding carbon, oxygen and nitrogen mappings in that order: Scale bars are 1  $\mu\text{m}$ . Nitrogen was only observed in MI-GnPs.



**Figure S3.** TGA thermograms obtained from the heating rate of 10 °C/min in (a) air; (b) nitrogen.



**Figure S4.** High resolution XPS spectra: (a) C 1s of MA-GnPs; (b) O 1s of MA-GnPs; (c) C 1s of MI-GnPs; (d) O 1s of MI-GnPs.



**Figure S5.** Photographs of EFGnPs dispersed solution in various solvents after 3 months standing on bench top in a normal laboratory conditions: (a) MA-GnPs; (b) MI-GnPs: (1) DI-water; (2) methanol; (3) ethanol; (4) acetone; (5) dimethylformamide; (6) 1-methyl-2-pyrrolidone; (7) toluene; (8) 1,2-dichlorobenzene; (9) hexane; (10) dichloromethane. Concentrations are 0.3 mg/ml.

**Table S1.** EA data of the pristine graphite, MA-GnPs and MI-GnPs

Sample	C (%)	H (%)	O (%)	N (%)	C/H	C/O	C/N
Graphite	97.71	BDL <sup>a</sup>	BDL	NA <sup>b</sup>	NA	NA	NA
MA-GnPs	86.10	1.07	10.10	NA	6.71	11.37	NA
MI-GnPs	84.97	1.21	8.91	3.06	5.85	12.72	32.40

a. BDL = Below detection limit.

b. NA = Not applicable.

**Table S2.** XPS and EDS data of the pristine graphite, MA-GnPs and MI-GnPs

Sample	Method	C (at.%)	O (at.%)	N (at.%)	C/O	C/N
Graphite	XPS	98.68	1.32	NA <sup>a</sup>	99.68	NA
	EDS	99.00	1.00	NA	132	NA
MA-GnPs	XPS	89.47	10.53	NA	11.33	NA
	EDS	91.14	8.86	NA	13.72	NA
MI-GnPs	XPS	87.99	9.05	2.96	12.96	34.68
	EDS	88.22	5.18	6.59	22.71	15.62

a. NA = Not applicable.



**Table S3.** Contact angles of MA-GnPs and MI-GnPs

No.	MA-GnPs	MI-GnPs
1	44.1	66.4
2	45.0	67.2
3	45.1	67.9
4	45.3	68.5
5	45.9	68.7
Average	45.08	67.74