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Supplementary file for

Microwave induced transformation of metal organic frameworks into defect rich carbon nanofibers.

Vadahanambi Sridhar and Hyun Park *

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Table T1 Representative morphologies of MOF derived carbons

S. No	Material	Carbonization Temperature/Time/atmosphere	Morphology	Reference
1	Electrospun Zn-MOF	1000 ℃/6 hours/Argon	Carbon fiber web	1
2	MIL-101, Alumina template	600 to 1000 ℃/ 5 hours/ Argon	Honeycomb carbons	2
3	Zn MOF-74	600 to 1000 ℃/ 5 hours/ Argon	Carbon nanorods	3
4	Co-MOF	500 ℃/ 2 hours/ Nitrogen	Disordered carbons	4
5	Basolite, F300	700 to 900 ℃/ 5 hours/ Argon	hollow carbon nanospheres	5
6	metal @ZIF-8	600 to 900 ℃/ 4 hours/ H_2 and Argon	Porous carbons	6
7	Cobalt-Melamine-BDC	700 to 900 ℃/ 4 hours/ Nitrogen	Disordered CNT carbons	7
8	Cobalt-triazine networks	700 ℃/ 3 hours/ Vacuum	Porous polyhedrons	8
9	Fe-MIL	500 ℃/ 2 hours in Argon; subsequent annealing in air for 2 more hours	Iron oxide@C	9
10	Ni-MOF	500 ℃/2 hours/Nitrogen	Nickel rich hollow carbons	10
11	ZIF-67	800 to 1000 ℃/ 5 hours/ Nitrogen	Sodalite structured mesoporous carbons	11
12	Ti-amino BDC	1000 ℃/8 hours/Argon	3D carbon cuboids	12
13	ZIF-67/LDH	400 ℃/ 3.3 hours/ Air	Hollow nanocages	13
14	ZIF-8	600 and 1000 ℃/ 1 hour/ Nitrogen	Mesoporous carbons	14
15	ZIF-67	350 ℃/ 2 hours/ Nitrogen	Cobalt rich carbon Hollow prisms	15
16	ZIF-8/MnO_2 Nanorods	700 ℃/ 4 hours/ Argon	$ZnMnO_4$ carbon rods	16
xx	DABCO based Co-MOF	Microwave/ 45 seconds/ Air	NCNF on rGO/ NCNF on Carbon fiber	

Materials and Methods

High purity graphite was purchased from Samjung C & G, Korea whereas sulphuric acid (H_2SO_4), hydrochloric acid (HCl), sodium nitrate ($NaNO_3$), hydrogen peroxide, potassium permanganate ($KMnO_4$), Dabco(1,4-diazabicyclo[2.2.2]octane) and cobalt nitrate were purchased from Sigma-Aldrich, Korea and were used as received. Microwave irradiation was carried out in a domestic microwave oven manufactured by Daewoo Korea.Field-emissionscanning electron microscopy (FE-SEM, Nova NanoSEM 230 FEI operating at 10kV and TALOS F200X Transmission electron microscopy operating at 200 kV were used to study SEM and HRTEM morphology, respectively. Due to inherently excellent electrical conductivity of both MDNCNT-Co@rGO and MDNCNT-Co@CF, there was no necessity of metal coating for SEM test. The structural properties were studied by X-ray diffraction (XRD, Rigaku D/max-2550V, Cu-Ka radiation) and by Raman spectra (LabRAM HR UV/vis/NIR Horiba Jobin-Yvon, France).Chemical analysis was performed byX-ray photoelectron spectroscopy (Sigma Probe Thermo VG spectrometer using Mg Kα X-ray sources). The XPS spectra were curve fitted with a mixed Gaussian-Lorentzian shape using the freeware XPSPEAKversion 4.1. BET surface area was measured by Nitrogen adsorption and desorption isotherms at 77K using a BEL Japan Inc. Belsorp Mini II Surface Area.Electrochemical tests were conducted using CR2032 coin-type test cells assembled in argon- filled glove box. Working electrodes were prepared with active materials and poly(acrylic acid) as the binder (mass ratio of 90: 10) were added to ethanol and mixed into a homogeneous slurry. The slurry was cast on a glass plate cleaned with piranha solution and dried at 100 °C in vacuum for 5 h. The coin cells were assembled with pure sodium foil as counter electrode, a glass fiber as separator, 1M $NaClO_4$ in ethylene carbonate/propylene carbonate (1:1 v/v) as electrolyte. Galvanostatic charge-discharge cycling tests were performed using an WBCS 3000, Won-A-Tech, Korea battery testing system in the voltage range between 0.005–3 V). EMI testing in the 1 to 18 GHz range was carried out as reported in our previous papers [21].

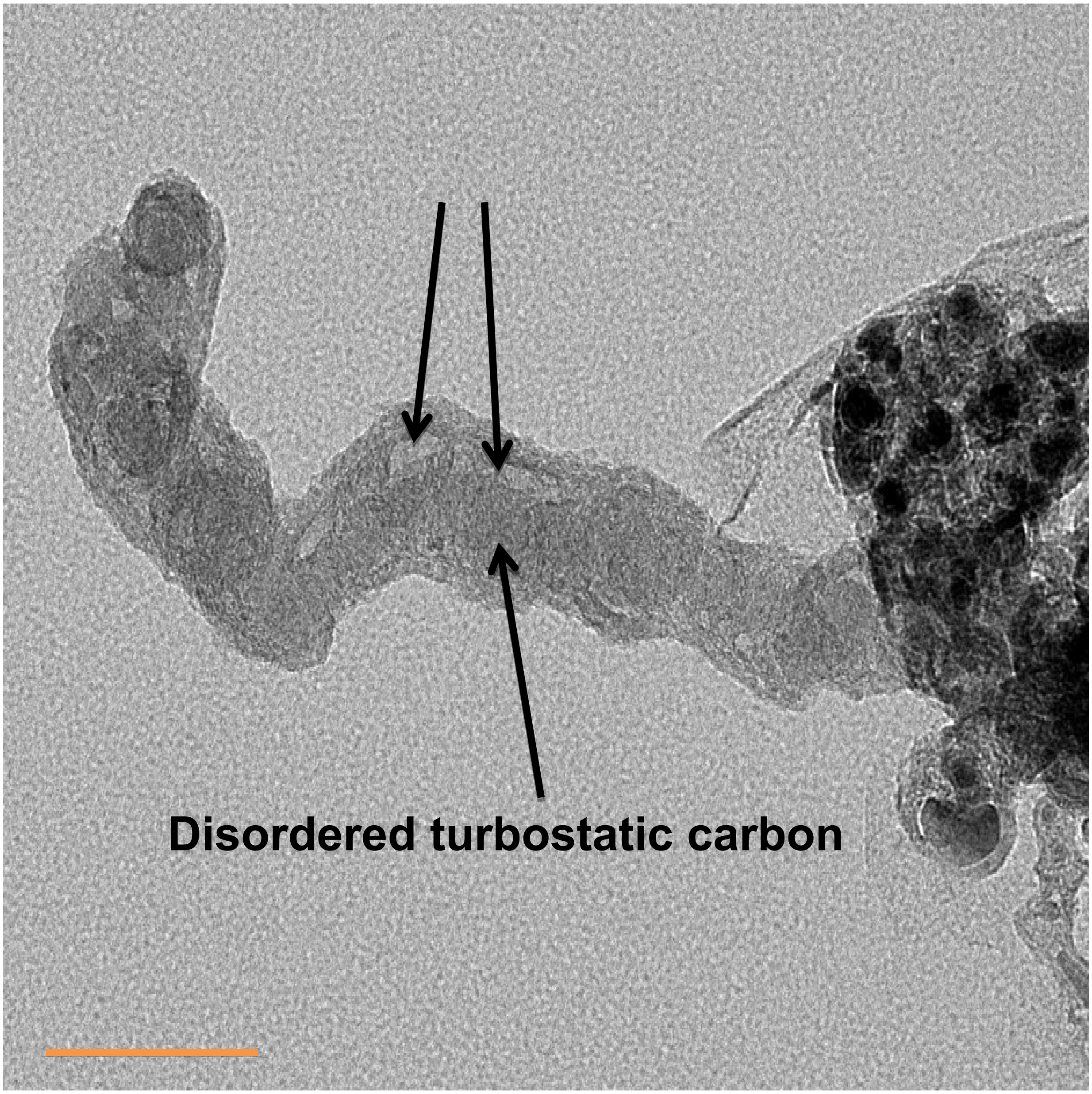

Figure S1 Representative HRTEM morphology of carbon nanofibers in MDCNF-Co@rGO showing disordered turbostatic graphene layers are dominant and minor quantities of hollow free space.

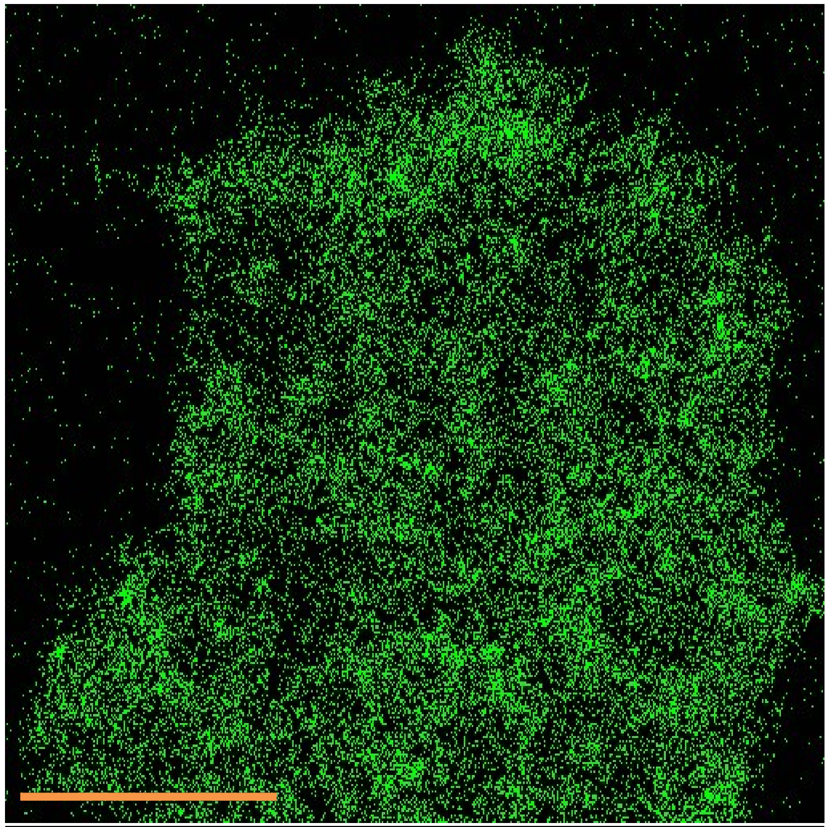

Figure S2Carbon map of MDNCNF-Co@rGO corresponding to TEM image of Fig. 1(g) in the main manuscript. Scale bar is 1µm.

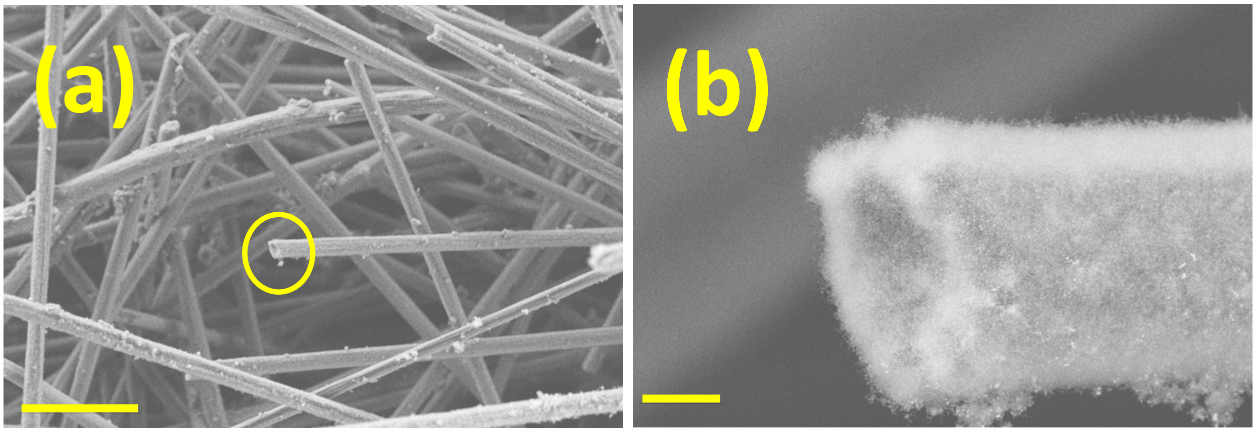

Figure S3Secondary electron back scattering image corresponding to Fig 5(a) and (b) of the manuscript. Scale bars in (a) and (b) are 5µm and 1µm, respectively.

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17. This work.