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Supplementary Information

Photosensitivity of the g-C_3N_4 / S-doped carbon composites: Study of surface stability upon exposure to CO_2 and/or water at ambient light

By

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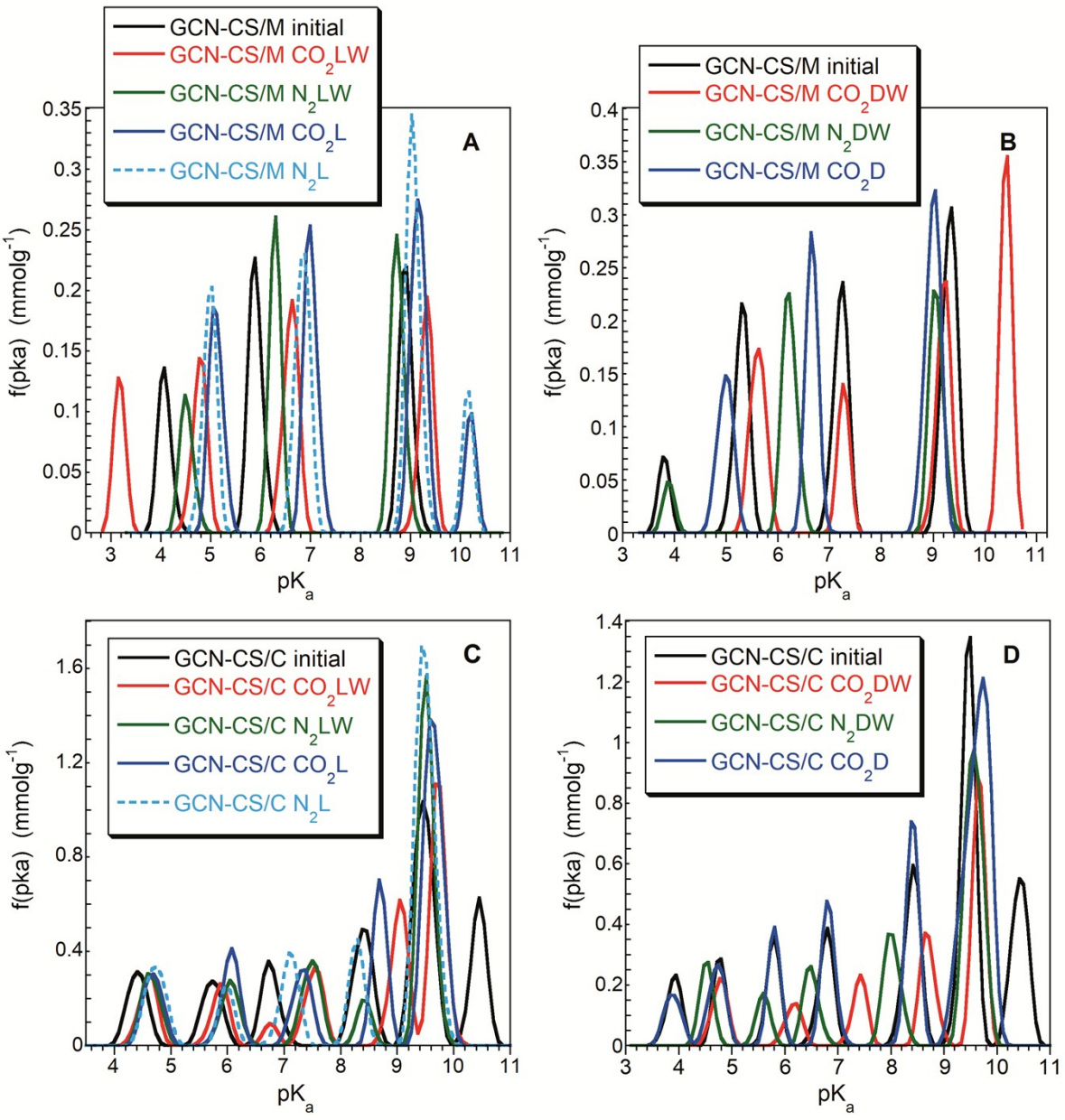

Fig. S1. pK_a distribution for GCN-CS/M (A, B) and GCN-CS/C (C, D) exposed to various environments.

Table S1. Surface pH values, peak positions and numbers of groups (in parentheses, [mmol/g]) for GCN-CS/M exposed to various environments.

Sample	Surface pH	pK_a 3-4	pK_a 4-5	pK_a 5-6	pK_a 6-7	pK_a 7-8	pK_a 8-9	pK_a 9-10	pK_a 10-11	All groups
GCN-CS/M initial	3.38	3.79 (0.021)		5.29 (0.076)		7.21 (0.085)		9.31 (0.117)		0.298
GCN-CS/M CO_2 L	3.38			5.10 (0.069)		7.00 (0.088)		9.15 (0.110)	10.20 (0.029)	0.295
GCN-CS/M CO_2 D	3.38		4.98 (0.058)		6.65 (0.087)		8.99 (0.123)			0.270
GCN-CS/M CO_2 LW	3.94		4.07 (0.047)	5.89 (0.081)		8.91 (0.077)				0.205
GCN-CS/M CO_2 DW	3.54			5.61 (0.071)		7.27 (0.041)		9.19 (0.082)	10.41 (0.107)	0.301
GCN-CS/M N_2 LW	3.53		4.51 (0.039)		6.29 (0.079)		8.74 (0.085)			0.203
GCN-CS/M N_2 DW	3.50	3.89 (0.014)			6.22 (0.082)			9.06 (0.081)		0.177
GCN-CS/M N_2 L	3.41		4.97 (0.070)		6.84 (0.091)			9.05 (0.034)	10.15 (0.034)	0.314

Table S2. Surface pH values, peak positions and numbers of groups (in parentheses, [mmol/g]) for GCN-CS/C exposed to various environments.

Sample	Surface pH	pKa 3-4	pK_a 4-5	pK_a 5-6	pK_a 6-7	pK_a 7-8	pK_a 8-9	pK_a 9-10	pK_a 10-11	All Groups
GCN-CS/C initial	4.06	3.90 (0.084)	4.76 (0.091)	5.78 (0.114)	6.77 (0.139)		8.40 (0.225)	9.45 (0.471)	10.42 (0.229)	1.342
GCN-CS/C CO_2 L	3.95		4.68 (0.138)		6.05 (0.155)	7.31 (0.140)	8.69 (0.229)	9.64 (0.607)		1.269
GCN-CS/C CO_2 D	4.01	3.88 (0.071)	4.71 (0.108)	5.79 (0.118)	6.82 (0.155)		8.40 (0.236)	9.62 (0.409)		1.398
GCN-CS/C CO_2 LW	3.82		4.59 (0.120)	5.87 (0.100)	6.76 (0.030)	7.53 (0.138)	8.99 (0.231)	9.73 (0.389)		1.007
GCN-CS/C CO_2 DW	4.05		4.78 (0.083)		6.20 (0.056)	7.44 (0.079)	8.71 (0.138)	9.65 (0.272)		0.629
GCN-CS/C N_2 LW	3.84		4.64 (0.133)		6.05 (0.114)	7.48 (0.156)	8.42 (0.065)	9.51 (0.545)		1.013
GCN-CS/C N_2 DW	4.04		4.52 (0.092)	5.59 (0.057)	6.49 (0.097)		8.02 (0.151)	9.56 (0.437)		0.834
GCN-CS/C N_2 L	3.91		4.72 (0.162)	5.98 (0.090)		7.10 (0.157)	8.29 (0.157)	9.49 (0.721)		1.287

Table S3 Elemental analysis for the initial samples and samples exposed to CO_2.

Sample	Mass (mg)	% C	% H	% N	% S	% O
GCN-CS/M initial	2.146	49.493	1.877	34.045	5.397	9.19
GCN-CS/M CO2 L	2.117	49.590	1.780	33.943	5.52	9.17
GCN-CS/M CO2 LW	2.168	53.913	1.398	28.745	3.42	12.52
GCN-CS/C initial	2.063	55.112	2.279	15.652	6.917	20.04
GCN-CS/C CO_2 L	2.175	55.185	2.086	15.901	6.828	20.00
GCN-CS/C CO_2 LW	2.178	55.602	2.138	15.995	6.818	19.45

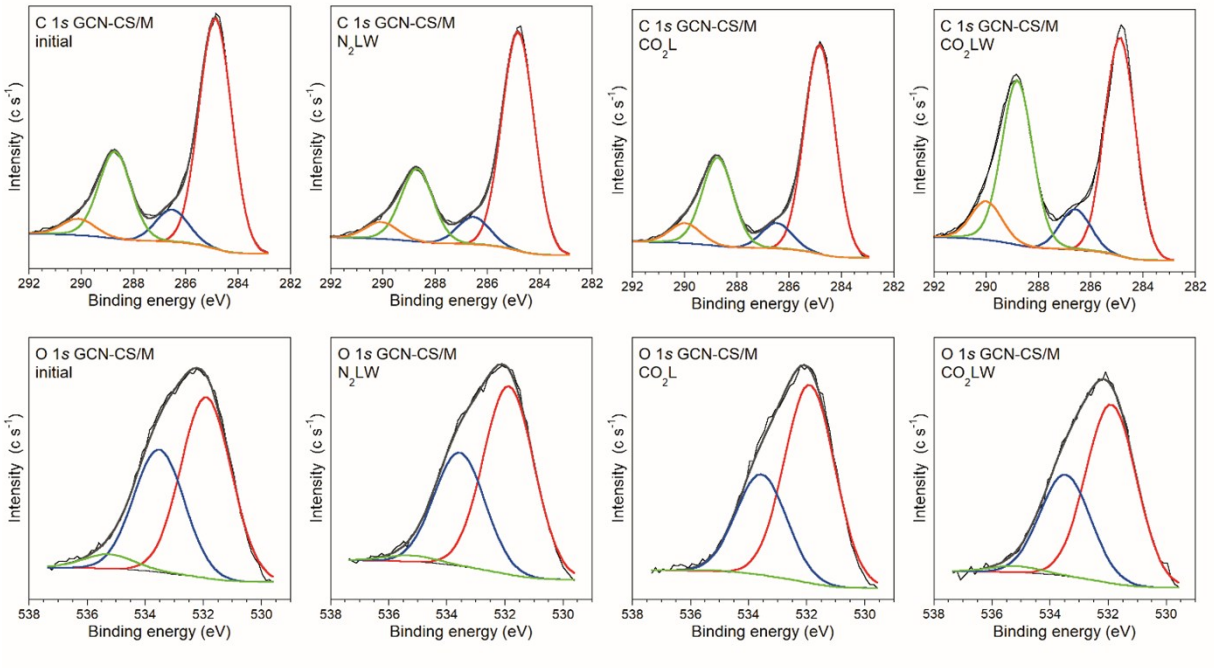

Fig. S2 Dceonvoluted C 1*s* and O 1*s* core energy level spectra for GCN-CS/M.

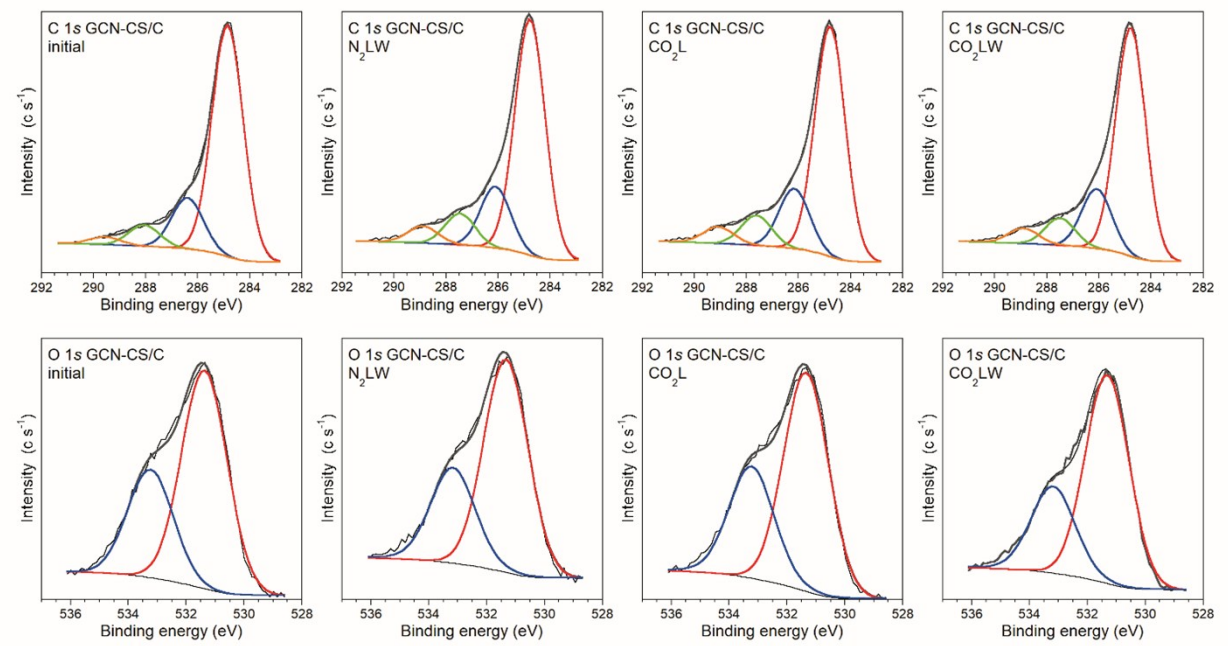

Fig. S3 Dceonvoluted C 1*s* and O 1*s* core energy level spectra for GCN-CS/C.

Table S4. The parameters of the porous structure for CS-GCN/M in different conditions.

Sample	S_{BET} (m^2/g)	V_t (cm^3/g)	V_{meso} (cm^3/g)	$V_{<0.7nm}$ (cm^3/g)	$V_{<1nm}$ (cm^3/g)	V_{mic} (cm^3/g)	V_{mic}/V_t
GCN-CS/M initial	166	0.223	0.154	0.053	0.059	0.069	0.309
GCN-CS/M CO_2 L	172	0.227	0.154	0.056	0.062	0.073	0.322
GCN-CS/M CO_2 D	161	0.217	0.145	0.056	0.065	0.072	0.332
GCN-CS/M CO_2 LW	142	0.161	0.109	0.026	0.036	0.052	0.323
GCN-CS/M CO_2 DW	194	0.263	0.190	0.056	0.060	0.073	0.278
GCN-CS/M N_2 LW	163	0.224	0.155	0.053	0.058	0.069	0.308
GCN-CS/M N_2 DW	192	0.307	0.227	0.053	0.061	0.080	0.261
GCN-CS/M N_2L	179	0.231	0.158	0.057	0.062	0.073	0.316

Table S5. The parameters of the porous structure for GCN-CS/C in different conditions.

Sample	S_{BET} (m^2/g)	V_t (cm^3/g)	V_{meso} (cm^3/g)	$V_{<0.7nm}$ (cm^3/g)	$V_{<1nm}$ (cm^3/g)	V_{mic} (cm^3/g)	V_{mic}/V_t
GCN-CS/C initial	326	0.248	0.092	0.129	0.142	0.156	0.629
GCN-CS/C CO_2 L	291	0.218	0.080	0.109	0.121	0.138	0.633
GCN-CS/C CO_2 D	286	0.215	0.089	0.092	0.107	0.126	0.586
GCN-CS/C CO_2 LW	251	0.189	0.070	0.078	0.094	0.119	0.630
GCN-CS/C CO_2DW	274	0.210	0.079	0.100	0.113	0.131	0.624
GCN-CS/C N_2 LW	278	0.216	0.085	0.084	0.098	0.131	0.606
GCN-CS/C N_2 DW	290	0.213	0.067	0.112	0.125	0.146	0.685
GCN-CS/C N_2L	257	0.192	0.068	0.096	0.107	0.124	0.646

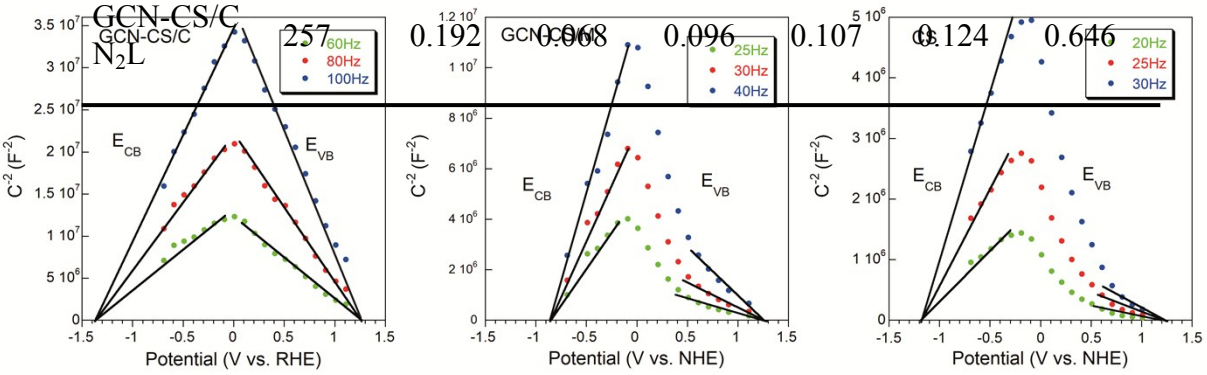

Figure S4. The Mott-Schottky plots for GCN-CS/C, GCN-CS/M and S-doped carbon.