Supplementary Materials

Chitosan as a biomass-based bridge: integrating CO_2 capture and electrochemical upgrading

Jiahui Bi*, Jing Zhang, Shuqi Lin

State Key Laboratory of Chemical Safety, College of Chemistry and Chemical Engineering, China University of Petroleum (East China), Qingdao 266580, Shandong, China.

***Correspondence to:** Assoc. Prof. Jiahui Bi, State Key Laboratory of Chemical Safety, College of Chemistry and Chemical Engineering, China University of Petroleum (East China), Qingdao 266580, Shandong, China. E-mail: bijiahui@upc.edu.cn

Supplementary Table 1. Comparison of the performance of CO_2RR over chitosan-derived electrocatalysts

Function of Chitosan	Electrocatalysts	Cell	Potential (V vs RHE)	Principal Product	FE (%)	*j* ($mA\cdot cm^{-2}$)	Ref.
C/N source	[a]Ni-N-CNS	H-cell	-0.67	CO	99.6%	10.54	[1]
	$NiCd_{650}F_{0.2}$	H-cell	-1.0	CO	90.3%	10.68	[2]
	[b]6%CSPB-900	H-cell	-1.78	CH_4	63.79%	28.88	[3]
	[c]In/N-dG	Flow-cell	-1.17	HCOOH	96.0%	1200	[4]
structure-inducing agent	[d]Sn/chi-rGO/SnO_2	H-cell	-1.8	HCOOH	88.0%	7.4	[5]
	[e]3D Cu-CS-GDL	Flow-cell	-0.88	C_{2+}	88.2%	900	[6]
	3D-CuAg-GDE	Flow-cell	–0.87	C_{2+}	82.04%	700	[7]
	[f]CuSn-15s	Flow-cell	-1.00	C_2H_5OH	74.3%	100	[8]
ion-exchange binder	Cu:CS GDE	MEA	-1.9	C_2H_4	93.7%	10	[9]
	Cu-chitosan-Ag	Flow-cell	-1.6	C_{2+}	83.7%	1000	[10]

[a]Ni-N-CNS: $Ni-N_3$ is fixed on the nitrogen-doped interconnect carbon nanosheets.

[b]6%CSPB-900：Ternary N, P, B-doped wood-derived carbon electrocatalyst.

[c]In/N-dG: Indium nanoparticles on chitosan-derived graphene.

[d]Sn/chi-rGO/SnO_2: A catalyst with SnO_2 on the surface, with Sn as the base material and a chitosan-reduced graphene oxide layer in the middle.

[e]3D Cu-CS-GDL: Three-dimensional copper-chitosan-gas diffusion layer electrode.

[f]CuSn-15s: Chitosan-supported CuSn bimetallic catalytic electrode.

Supplementary Table 2. Comparison of the performance of CO_2 capture over chitosan-based adsorbents

Type	Adsorbents	CO_2 adsorption capacity ($mmol \cdot g^{-1}$)	CO_2/N_2	BET ($m^2 \cdot g^{-1}$)	Pore area ($m^2 \cdot g^{-1}$)	Ref.
3D Porous Structure	Chi-G-900	4.11		657		[11]
	[a]PCHL-2	4.05	36	541	501	[12]
	[b]FA/CS1-50PEI	1.96		14.03		[13]
	[c]ACF-96	3.59	90.3	389.2		[14]
	[d]C0700	6.77		1221	972	[15]
	C2600	5.51	26.4	963	872	[15]
Amine-functionalized Composites	CHIT-CO3-700	5.3	1.7	1647	88	[16]
	[e]HTC48-CO3-600	4.7	10	1141	88	[16]
	[f]GO-CS-C1	7.5		8		[17]
	[g]NBPC-10	7.62		1553	1390	[18]
	NBPC-30	3.74	30	1195	1101	[18]
	CS/ACG	0.34		5		[19]
	MCM-41@Chitosan	8.90		460.73		[20]
	Clinoptilolite@Chitosan	9.01		2.71		[20]
	[h]3D-NPC-500	5.70		1169	1105	[21]
	[i]SBA-15- CHIT 50%	0.7		240		[22]

[a]PCHL-2: Chitosan polypyrrolebenzoxazine bio-based carbon adsorbent.
[b]FA/CS1-50PEI: Chitosan-modified amine-impregnated fly ash.
[c]ACF-96: Amine-functionalized chitosan foam.
[d]C0700: Preparation of nitrogen-doped chitosan hierarchical porous carbon by molten salt method.
[e]HTC48-CO3-600: The material obtained by initially hydrothermal carbonization of chitosan and subsequent calcination in the presence of K_2CO_3.
[f]GO-CS-C1: Column-supported graphene oxide-chitosan composite material.
[g]NBPC-10: Chitosan-based porous carbon materials with built-in Lewis acid boron sites.
[h]3D-NPC-500: Layered stacked structure chitosan-based porous carbon material.
[i]SBA-15- CHIT 50%:Impregnated chitosan-based MCM-41 and SBA-15 mesoporous silica.

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