Supporting information

The role of electrode wettability in electrochemical reduction of carbon dioxide

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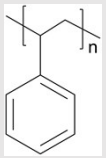
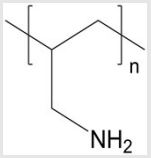
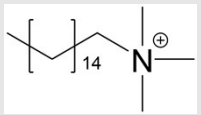
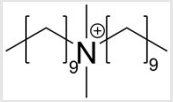
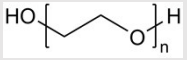
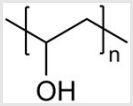
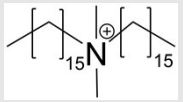
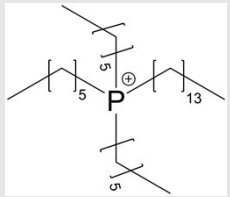
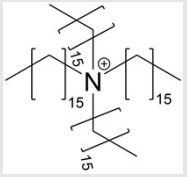
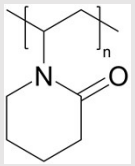
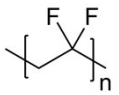
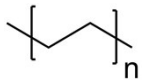
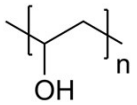
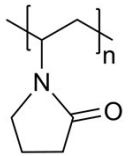
Table S 1 A summary of recent advances in modifying catalyst surface wettability via additives for CO_2 electrochemical reduction.

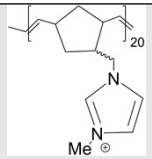
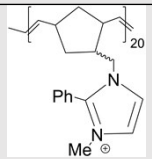
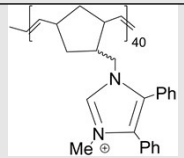
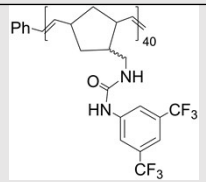
Catalyst	Substrate	Additives	Preparation methods	Contact angle (°)	Potential (V vs RHE)	Faradaic Efficiency (%)									Peak current density (mA cm^{-2})	Catholyte	Membrane	References
						Hydrogen	Formate/formic acid	Carbon monoxide	Methane	Ethylene	Ethanol	Acetate	Ethane	n-Propanol				

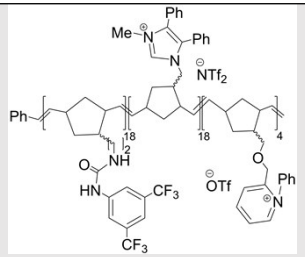
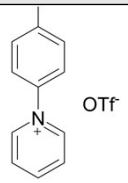
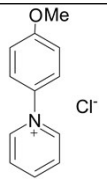
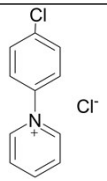
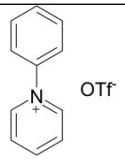
PTFE-treated Ni-embeded nitrogen-doped carbon nanotubes	carbon fibre	PTFE (1wt%)	Vertically aligned Ni(OH)2 nanosheets were first grown on the CNF via hydrothermal method; growth of Ni-embedded nitrogen-doped carbon nanotubes via calcination with melamine followed being soaked in concentrated HCl at 85 ^{0}C; after washed with water, the obtained samples were immersed in PTFE aqueous solution, followed by heating at 350 ^{0}C.	147	-0.78	6.41		95.6							4.56	0.5M $KHCO_3$	Nafion	[1]
		PTFE(0.25wt%)		0	-0.78	24.6		68.4							5.8			
		PTFE (0.5wt%)		16	-0.78	18		73.8							6.5			
		PTFE (0.75wt%)		121	-0.78	16.8		70.6							7.2			
		PTFE (1.25 wt%)		153	-0.78	5.28		90.5							4.6			
		PTFE (1.5 wt%)		146	-0.78	3.86		93.4							2.2			
Oxide-derived Cu	Metal foil	N.A	Drop casting solution of the organics onto the metal surface. Nafion was there after drop cast onto the surface.	27	-0.7	28	34	28							0.7	0.05 M K_2CO_3 and 4 mM KCl aqueous solution	Selemion AMV	[2]

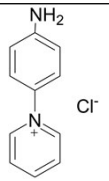
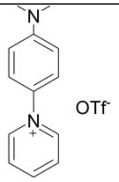
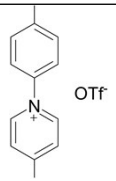
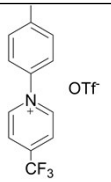
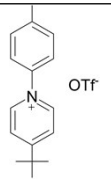
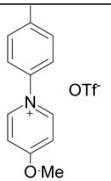
		Polystyrene 		97	-0.7	44.6	23.5	19							0.8			
		Polyallyamine 		54	-0.7	97	8	1.6							5.6			
		Cetytrimethyl ammonium bromide 		5	-0.7	34	56	3.6							4.2			
		Didecyldimethyl ammonium bromide 		13	-0.7	21	62	8							2.5			
		Polyethylene glycol 		14	-0.7	44	38	16							0.7			
		Polyvinyl alcohol 		40	-0.7	71	17	15.1							0.5			

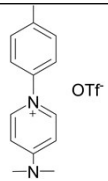
		Dihexadecyl demethylammonium bromide 		48	-0.7	3	18	76							0.3			
		Trihexyltetra decyphosponium bromide 		48	-0.7	27	11	49							0.1			
		Tetrahexadecylammonium bromide 		65	-0.7	27	30.5	33.8							0.7			
		Polyvinyl pyrrolidone 		11	-0.7	43	45	10							0.8			
CuO-derived Cu nanoparticles	Carbon paper Toray 060	PVDF 	First CuO nanoparticles were drop casted onto carbon paper, followed by drop casting of the polymers and/or Nafions	126	-1.12	28				32.7					12.3	0.5M $KHCO_3$	N/A	[3]

		PE 		127	-1.12	28.5				29.5					12.6			
		PVA 		68	-1.12	49.5		3	8.4	22.7					7			
		PVA + Nafion		85	-1.12	51.5		4.1	5.8	17.4					7.1			
		PVP 		71	-1.12	52.1		6.4	2.3	12.8					8.5			
		PVP + Nafion		84	-1.12	50.3		5.9	2.2	15.1					9.3			
Cu nano dendrites	Cu foil	N.A		17	-1.6	71	7.3	0.6		8.7	4.5	0.3	0.5			0.1M $CsHCO_3$	Nafion	[4]
		Alkanethiol	Submerged the Cu nano dendrite into 1-octadecanethiol under vacuum at 60 ^{0}C	153	-1.6	9.64	1.88	3.38	6.94	56.3	16.1	3.44	9.64					

CuO-derived nonawire array	Cu foil	N.A		33	-1.1	38.5	10	4.1		23.8	10.6		2.4	14.8	20.7	0.1M KHCO3	N.A	[5]
		PTFE	Soak the catalyst in PTFE solution the, followed by annealing at 350 ^{0}C	137	-1.1	17.1	26.7	23.8		13.5	10				18.85			
Cu surface modified with organic modifiers	Cu foil		The Cu foil was spin coated with polymer methanol solution followed by annealed at 70 ℃ for 10 min	73	-1.08	94.6	0.7		1.5						12.2	0.1M KHCO3	Selemion AMV AEM	[6]
				78	-1.08	69.3	6.6	1	14.1	5.3					3.9			
				88	-1.08	37.8	11.1	2.8	14	21.5	3.4			2.6	2.75			
				90	-1.08	33.6	1.1	0.5	28.1	25.5	6			1.1	4.64			

				104	-1.08	17.4	1.9	0.7	1.9	11.9	17.4			4.3	4.66			
Cu surface modified with the organic modifier	PTFE GDL		Cu was sputtered on to the PTFE membrane, followed by electrodeposition of the organic film on the surface in 0.1M $KHCO_3$ solution containing 10mM additives	51	-0.83	7.9	2.2	5.3	0.3	64.6	16.7	3.5		2.1	N.A.	1M KHCO3	Fumapem FAA-3-PK-130	[7]
				67	-0.83	10.1	2.1	8.8	0.5	57.3	16.2	1.9		1.8	N.A.			
				51	-0.83	5.1	3.3	6.3	1.8	63.1	17.6	1.1		4.7	N.A.			
				61	-0.84	10.5	1.4	6.3	0.5	59.9	15.6	1.1		2.5	N.A.			

				58	-0.82	22.2	3.5	4.8	0.4	50.4	15.6	2.8		2.7	N.A.			
				60	-0.83	24.8	1.6	3.4	2.2	43.9	18.7	4.2		1.1	N.A.			
				68	-0.83	7.5	1.9	10.1	0.8	57	16.2	2.1		2.5	N.A.			
				60	-0.84	12.6	1.6	12.5	0.7	55.1	11.7	2		2.3	N.A.			
				60	-0.83	13.4	1.5	12.6	0.2	55.2	12.5	1.4		2.8	N.A.			
				56	-0.83	22	1.4	4.6	1.1	51.8	13.6	1.3		2.4	N.A.			

				57	-0.82	36.7	3.7	3.5	0.3	37.5	13.9	0.9		4.4	N.A.			

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