Supporting Information

Ampere-level electroreduction of CO_2 and CO

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Table S1. Summary of catalysts performances for CO_2RR at ampere-level current

Catalysts	Catalyst loading (mg cm^{-2})	Electrolysis window (cm^2)	Electrolyte	Potential (V vs RHE) / Cell voltage (V)	$FE_{main\ product}$	$j_{main\ product}$ (mA cm^{-2})	Maximum operation current (mA cm^{-2})	Energy efficiency (%)	Stability (h)	Ref.
Ni-N/C	3.0 ± 0.1	Flow cell (1)	1 M KOH	−0.9	89.3% (CO)	447.6 mA cm^{-2} @ −1 V vs RHE			6 h @ -1 V vs RHE	[1]
O–Ni–N_x–C	1	Flow cell (2*0.5)	1 M KOH		> 96% (CO)	944.1	1000			[2]
Ni-SAC-CNT	0.8	Flow cell (2)	1 M KOH	−0.4	> 90% (CO)	~450	800		8 h @ 200 mA cm^{-2}	[3]
NiSA	1.25	MEA (100)	0.1 M $KHCO_3$	−2.8	96% (CO)	7680	8000 (total)		6 h @ 8000 mA cm^{-2}	[4]
IPCF@CS	0.8	Flow cell (1)	Catholyte: 0.5 M K_2SO_4 Anolyte: 0.5 M H_2SO_4	−1.07 to −1.58	> 99.08% (CO)	572			16 h @ 200 mA cm^{-2}	[5]
Ni_2NC	1	Flow cell	1 M KOH	−0.8	99% (CO)	1000			30 h @ −0.37 V vs RHE	[6]

Ni-N-C	2	Flow cell (0.25)	1 M KOH	−0.96	98% (CO)	726		70 h @ −0.6 V vs RHE	[7]
Ni-NBr-C	0.5	MEA	1 M KOH	2.66±0.2	97% (CO)		897.5	85 h @ 350 mA cm^{-2}	[8]
A-Ni@CMK	1	Flow cell	1 M KOH	−0.5	100% (CO)	366		5	[9]
$Ni_{NC\&SA}$/N-C		Flow cell	1 M KOH	−1.15	100% (CO)	969	1000	10 h @ 200 mA cm^{-2}	[10]
			1 M KCl	−1.15	100%	860	900		
			1.0 M KCl+H_2SO_4 (pH=2)	−2.25	100%	801	800		
Ni-ASCs/4.3 wt.%	1.5	Flow cell	1 M KOH	−1.27	95.1% (CO)	533		2.2 h @ −0.77 V vs RHE	[11]
		MEA	1 M $KHCO_3$	3.5	100% (CO)	450.3		10 h @ 3.3 V	
Ni/N/C	0.4	Flow cell	1 M KOH	−1.4	80.4% (CO)	528		12 h @ 200 mA cm^{-2}	[12]
Ni−N_5−C	0.3	Flow cell (0.2)	1 M KOH	−2.4	99.6% (CO)	1230	1260	100 h @ −2.2 V	[13]

NiPc/NMCN		MEA (1)	1 M KOH		60% (CO)	528	2000			[14]
Ni_6@Ni-N_3		Flow cell	1 M KOH	−1.15	99.7% (CO)	498.5	500			[15]
O–Ni–N_x–GC		Flow cell	1 M KOH		> 96% (CO)	960.5	1000		100 h @ 140 mA cm^{-2} 34 h @ 200 mA cm^{-2}	[2]
Cu/Ni-NC		Flow cell (1.05)	1 M KOH		> 99% (CO)	489 ± 14			25 h @ 100 mA cm^{-2}	[16]
2D meso Ni-N-C		Flow cell	0.2 M $KHCO_3$		> 90% (CO)	446.2	700			[17]
	1	MEA	1 M $KHCO_3$	2.8	> 90% (CO)	254.1	> 1000	42	50 h (0.1 M $KHCO_3$)	
Ni-ZIF-8	0.87	Flow cell (1)	1 M KOH		96% (CO)	1060	1200		10 h @ 200 mA cm^{-2}	[18]
Ni-CN-3DF		Flow cell	1 M KOH		99.1% (CO) @ 300 mA cm^{-2}		500			[19]
		MEA (2*2)	0.5 M $KHCO_3$		98.7% (CO) @ 250 mA cm^{-2}		350			
		MEA (5*5)	0.5 M $KHCO_3$		> 98% (CO)		7 A			

					@ 6 A (total)		(total)		
Cu_3N-HDD		Flow cell	1 M KOH		75.8% (C_{2+}) @ 500 mA cm^{-2}		700		
$Zn^{\delta+}$-NC	1	Flow cell	1 M KOH		> 95% (CO)		1000		2 h @ 500 mA cm^{-2} [20]
3D NiCu-69	1	Flow cell	1 M KOH		98% (CO)		800		22 h @ 100 mA cm^{-2} 20 h @ 200 mA cm^{-2} [21]
NiCd−HDAC	1	Flow cell	1 M $KHCO_3$		95.7% (CO)	574.3	600		[22]
ZnNi-TACs		Flow cell	1 M KOH	−0.9	98.9% (CO)	485			[23]
Co-N-C		Flow cell	1 M KOH	−1.7	99.8% (CO)	349.3	600		8 [24]
Al–NC	0.5	MEA (4)	1 M $KHCO_3$	2.35	93.88% (CO)	605	700		16 h @ 400 mA cm^{-2} [25]
Zn-N/Se-C	0.8	Flow cell	1 M KOH	−0.8	97.3% (CO)	539.7			10 h @ −1 V [26]
Ag@ionomer		MEA (4)	0.1 M Cs_2CO_3	−3.2	> 90% (CO)		600	∼32%	> 220 h @ 300 mA [27]

									cm^{-2}	
CoTAAPc@CNT-12		Flow cell	0.05 M H_2SO_4 + 3.0 M KCl	−1.5 −1.82	93.3% (CO) 100%	568.6 526.8	609.7		8 h @ −1.35 V and 200 mA cm^{-2}	[28]
Ag@Ag-TCNQ	1	Flow cell	0.5 M K_2SO_4 + H_2SO_4		100% (CO)	497.5	700		100 h @ 300 mA cm^{-2}	[29]
CoPc@GO	CoPc: 0.06	Flow cell	1 M KOH		96.33 ± 2.50% (CO)	481.65 ± 12.50	500		1.5 h @ 300 mA cm^{-2}	[30]
Ag@C-d	2	Flow cell	0.5 mM H_2SO_4 + 0.5 M K_2SO_4		> 98% (CO)		500		100 h @ 100 mA cm^{-2}	[31]
	1	MEA	0.15 M K_2SO_4		91.6% (CO)	183.2		40% @ 100 mA cm^{-2}	20 h @ 100 mA cm^{-2}	
CoCu DASC	1	Flow cell (1)	1 M KOH		99.1% (CO)	483	500		10 h @ 100 mA cm^{-2}	[32]
$Cu_{92}Sb_5Pd_3$	1	Flow cell (0.6)	1 M KOH		100% ±1.5% (CO) @ 402 mA cm^{-}		1000		528 h @ 100 mA	[33]

					^{2}			cm^{-2}	
NiFe-DAC	1	MEA (25)	1 M KOH	2.91	98.7% (CO)		6000 (total)	87.4% @ 200 mA cm^{-2} 85.8% @ 300 mA cm^{-2}	[34]
		MEA (140, four cell stack)	0.1 M $KHCO_3$		＞98% (CO)		28000 (total)	6 h @ 200 mA cm^{-2}	
Au	0.4	MEA (3.2)	alkaline polymer	3	＞85% (CO)		500	62	100 h @ 50 °C and 100 mA cm^{-2}	[35]
AgNP	2 ± 0.1	Flow cell	3 M KOH	3	> 90% (CO)	~460			/	[36]
Ag HF		Gas-tight two-compartment electrolysis cell (0.5)	3.0 M KCl + 0.01 M $KHCO_3$	−0.91	92.3% (CO)	920	1200	57.8	150	[37]
Hg-CoTPP/NG		Flow cell	1 M KOH	−0.74	100% (CO)	1186.8	1200		360 h @ 420 mA cm^{-2} > 1 h @	[38]

									1000 mA cm^{-2}	
Cl-aAg HPE		Home-made gas-tight two-compartment quartz electrolyzer	Catholyte: 3 M KCl Anolyte: 1 M KOH	−1.08	90.3% (CO)	3160	4000	52	200 h in 3 M KCl @ 2000 mA cm^{-2}	[39]
Ni-N-C		MEA	Anolyte: 0.5 M K_2SO_4 + H_2SO_4	3.64	95% (CO)	425.6	500	45% @ 300 mA cm^{-2}	8 h @ 500 mA cm^{-2}	[40]
Ag-NOLI	0.44	GDE configuration	1 M $KHCO_3$		98.1% @ 400 mA cm^{-2} (CO)		500			[41]
Ag NPs		PiperION-MEA	1 M KOH	2.6–3.4 V	90% (CO)	> 1000				[42]
CD-Ag HPE		Home-made gas-tight two-compartment quartz electrolyzer	0.05 M H_2SO_4 + 3 M KCl	−1.41	95% (CO)	4300	5000		200 h @ 2000 mA cm^{-2}	[43]
			0.05 M H_2SO_4 + 3 M KCl	−0.98	90% (CO)		2500			
Ag-TEL	1	flow-through induced dynamic triple-phase boundaries	0.5 M $KHCO_3$	−3.5	92.0 ± 3.0% (CO)	1637.6	3370	> 40	48 h @ 100 mA cm^{-2} 210 h	[44]

		cell (FTDT, 1)						@ 1 mA cm^{-2}	
				−4.5	88% (CO)	2965.6		84 h @ 2.9 V and 100 mA cm^{-2}	
		(FTDT, 4)		−3.5	91% (CO)	846.3	> 30		
		(FTDT, 100)		−3.5	92% (CO)	570.4	< 30		
				−4	88% (CO)	792			
Cu-TE	1	(FTDT, 1)	0.5 M $KHCO_3$	−3.3	32% (C_2H_4)	384			
				−3.1	39% (C_2H_4)	241.8			
				−2.9	46% (C_2H_4)	276			
activated Ag HF		Flow cell	1.5 M $KHCO_3$	−0.83	92.7% (CO)	1170		170	[45]
				−0.86	90.6% (CO)	1330			
				−0.89	83.1% (CO)	1402			
				−0.94	62.6% (CO)	1267			
Nano Ag@Ni foam		Flow cell	30 wt% $[C_4mim][PF_6]$ / 70wt% MeCN	2.47 V vs. Fc/Fc^+	96.5% (CO)	528.3			[46]
2H/*fcc* $Au_{99}Cu_1$ hierarchical nanosheets	1	Flow cell (1)	1 M KOH		92.6% (CO)	463		17 h @ 300 mA cm^{-2}	[47]
					96.6% (CO)	289.8			
Zn_1Mn_1-SNC DASC	1	Flow cell	0.5 M $KHCO_3$	−0.85	> 90% (CO)	450	500	90 h @ −0.66 V	[48]

Ag/GDE	~0.27	MEA (1.5*1.5 cm^2)	10 mM CsOH	4	90% (CO)	650	1950 (total)		100 h @ 500 mA cm^{-2}	[49]
Ag/C		Flow cell (0.36)	1 M KOH	−1.6	95% (CO)	765.6	1200		39 h @ 100 mA cm^{-2}	[50]
Ag nanoparticles	1	MEA (HQPC-tmIM membrane)	0.1 M $KHCO_3$	−3.5	90% (CO)	603			150	[51]
CoTAAPc@CNT-12		Flow cell (1)	0.05 M H_2SO_4 + 3.0 M KCl		93.3% (CO)	609.7			8 h @ 200 mA cm^{-2}	[28]
Ni_1-N/C_{NP}	1	Flow cell (1)	1 M KOH		96.4% (CO)	482	700	78.9	12.5 h @ 250 mA cm^{-2}	[52]
CoPc/d-CNT		Flow cell (0.5*2)	0.5 M $KHCO_3$		96% (CO)	480	500		20 h @ 150 mA cm^{-2}	[53]
Ru_1/SDC-LSCF		Solid oxide electrolysis cells (800 °C)	LSGM electrolyte	1.6	~100% (CO)	1680	2390 @ 1.16 V		100 h @ 1.1 V	[54]
MW-BiN_3-POMC		Flow cell (2*0.5)	0.5 M $KHCO_3$	−0.3 to −1.3	> 90% (CO)	414			30	[55]
Ag: Cs-DC		MEA (5 cm^{-2}, 55 °C)	0.25 M $KHCO_3$		96.1% (CO) @ 400 mA		700			[56]

					cm^{-2} 89.1% (CO) @ 400 mA cm^{-2}	500			
Ag NPs		Flow cell (1)	Catholyte: 2 wt% polystyrene sulfonate + 0.1 M H_2SO_4 + 0.2 M K_2SO_4 Anolyte: 0.5 M H_2SO_4		93.9% (CO) @ 250 mA cm^{-2}		500		12 h @ 200 mA cm^{-2}	[57]
Ag-TDC@EtOH		MEA			> 90% (CO)		900		40 h @ 200 mA cm^{-2}	[58]
		Flow cell (1)	0.5 M K_2SO_4 + H_2SO_4 (pH = 3)	−2.25	> 97% @ 10 – 400 mA cm^{-2} 75% @ 600 mA cm^{-2} (CO)	451	900		36 h @ 300 mA cm^{-2}	
Ag-TDC@HEX				−1.77	45% (CO) 41% (HCOOH)	180 164	900			
Ag-TDC@MeOH				−1.8	22.3% (CO) 60% (HCOOH)	89.2 240	900			
Ag-OC_6	0.5	MEA	0.1 M CsOH	3.5	90% (CO)	450	900	51	110 h	[59]

								@ 300 mA cm^{-2} 80 h @ 600 mA cm^{-2}	
Ag crystal–triazole	1	Flow cell (1)	1 M KOH	−0.9	98% (CO)	802.5			[60]
		MEA	0.1 M $KHCO_3$		96.1% (CO)	525.3		> 60	70 h @ 300 mA cm^{-2}
Cu@PIL@Cu		Flow cell	Anolyte: 0.5 M H_2SO_4 Catholyte: 0.005 M H_2SO_4 + 3 M KCl		83.1% (CO)	304.2	900	37.6	16 h @ 150 mA cm^{-2} [61]
Ag	1	MEA	0.1 M $KHCO_3$		95% (CO)	409	500		12 h @ 100 mA cm^{-2} [62]
CuSb-2		Flow cell	1 M KOH	−0.6 −1.1	98.2% (CO) 75.6% (C_{2+})	430 850	1300		10 h @ 300 mA cm^{-2} 10 h @ 1100 mA cm^{-2} [63]

Sheet-like Bi		Flow cell (1)	Anolyte: 0.5 M H_2SO_4 Catholyte: 0.1 M H_2SO_4 + 0.5 M K_2SO_4		96.3% (formate)	471	500			[64]
		Slim flow cell (5)	Anolyte: 0.5 M H_2SO_4 Catholyte: 0.05 M H_2SO_4 + 0.5 M K_2SO_4	−4.56	95.8% (formate)	1200 mA (total)	1500 mA (total)	40% @ −2.96 V	50 h @ 500 mA	
Gemini-Bi_2O_3		Flow cell	1 M KOH	−1.1	91% (formate)		510			[65]
RD Bi	2	MEA (2)	Solid state electrolyte		94.2% @ 1200 mA cm^{-2} (formate)	1160	1400		300 h @ 200 mA cm^{-2}	[66]
$Bi(OH)_3$-after	1	Flow cell (0.5*0.5)	0.5 M $KHCO_3$		97.1% (formate)	971	1000			[67]
	1	MEA (5)	20 mM Cs_2CO_3	3.1～3.14	> 85% (formate)	170	2 A	33.6	200 h @ 200 mA cm^{-2}	
Cu-$Bi_2O_2CO_3$		Flow cell	1 M KOH		> 98% (formate)		800		20	[68]
TeBi nanotips	1	Flow cell (1)	1 M KOH	−0.9～ −1.7	> 90% (formate)	～325	450		100 h @ −0.65 V	[69]

		MEA	1 M KOH	2.4～3.2	> 90% (formate)	540 mA cm^{-2} @ 3.2 V			
p-SnS_x		AEM-based MEA (5)	0.1 M $KHCO_3$	−2.6	93 ± 3% (formate)	420		30	[70]
CuS 811		Flow cell (1)	1 M KOH		92% (formate)	321	500	33 h @ 100 mA cm^{-2} 27 h @ 200 mA cm^{-2}	[71]
r-Pb	2	PEM electrolyser (1)	H_2SO_4 + KOH	2.2	93% (formate)	1116	1200	5200	[72]
		PEM electrolyser (5)		2.7	> 91% (formate)		15 A (total)		
2,5-TDC In-MOF	2.5	Flow cell (1)	1 M KOH		93.34% (formate)	> 900	1100	36 h @ 300 mA cm^{-2}	[73]
Cu–SnO_2	0.8	Flow cell (1)	1 M KOH		70% (formate)	210	500	5 h @ 200 mA cm^{-2} 50 h @ 500 mA	[74]

								cm^{-2}	
Bi-CrO_x	1	Flow cell	1 M KOH	−0.9	～100% (formate)	687		32 h @ −0.6 V	[75]
Bi NS		Flow cell (1)	1 M CsOH	−1.8	93% (formate)	870		10 h @ 100 mA cm^{-2}	[76]
Cu-doped Bi	1	Flow cell	5 M KOH	−0.86	85.1% (formate)	1132		5 h @ −0.5 V	[77]
			1 M KOH		92.6% (formate)	600		100 h @ 400 mA cm^{-2}	
Sb_2Bi_6	0.5	Flow cell (1)	1 M KOH	−1	> 90% (formate)	734	800	10 h @ 100 mA cm^{-2}	[78]
np-Bi	0.5	Flow cell (1)	1 M KOH	−0.45 ～ −0.62 V	～100% (formate)	500		2 h @ 100 mA cm^{-2}	[79]
In-Bi_2O_3-100		Flow cell	1 M KOH	−1.2	96.8% (formate)	407.5		25 h @ 100 mA cm^{-2}	[80]
e-SnO_2	2.0 ± 0.1	Flow cell	1 M KOH	−0.68 ～ −1.14 V	> 90% (formate)	535 ± 12		43 h @ 400 mA cm^{-2}	[81]
$Bi_{60}In_2O_{93}$	1	Flow cell (1)	1 M KOH	−1	95.3 ± 2.9%	1030 mA	1120	500	[82]

					(formate)	cm^{-2} @ -1.3 V			min	
		MEA (1)	0.1 M KOH		89% (formate)		1110		48 h	
In/In_2O_3	2	Flow cell	1 M KOH	−1.2	93% @ -0.9 V (formate)	~ 590	650		4 h @ −0.9 V	[83]
		MEA	0.1 M KOH		90.6% @ 150 mA cm^{-2} (formate)			44.5	70 h @ 200 mA cm^{-2}	
$Ag/Sn–SnO_2$ Nanosheets	2	Flow cell (1)	1 M KOH	−2.01	~100% (formate)		2000		200 h @ 200 mA cm^{-2}	[84]
		MEA with solid electrolyte cell (2)	Porous styrene–divinylbenzene sulfonated co-polymer		83% (formate)		1000	80	200 h @ 100 mA cm^{-2}	
Bi-MOF-MF	1	Flow cell (0.5*0.5)	1 M KOH	−1.5	> 90% (formate)	945				[85]
Bi-MOF-TS			1 M KOH Acid (pH = 1.5 ± 0.2)	−1.5	> 90% 87 ± 0.92%	1301 870	1000		60 h @ 500 mA cm-2	
Bi(110)-S-Na	1	Flow cell	1 M KOH	−0.64	95.8 ± 2.8% (formate) 83.5%	958 ± 28 2505 ± 75	3000		4000 s @ 1000	[86]

					(formate)				mA cm^{-2} 30 h @ 600 mA cm^{-2}	
Bi-TDC@DMF MOF		Flow cell	H_2SO_4 + K_2SO_4	−1.32 to −1.3	> 90% (formate)		700			[87]
		PEM-MEA	H_2SO_4 + K_2SO_4	−3.5	93.5% (formate)			38.2%	100 h @ 250 mA cm^{-2}	
Cl-SnO_2@Ni HF		Gas-tight electrolysis cell	Anolyte: 2 M $KHCO_3$ Catholyte: 2 M KCl		99% (formate)	1860	3500		520 h @ 3000 mA cm^{-2}	[88]
Bi HF		Gas-tight electrolysis cell	2 M $KHCO_3$	−1.26	95% @ -0.59 V (formate)	1042			40 h @ −1.01 V	[89]
nBuLi-Bi	0.7	Flow cell (1)	1 M $KHCO_3$	−1.05	97% (formate)	460			100 h @ 30 mA cm^{-2}	[90]
		Solid state reactor (4.75)	porous solid electrolyte	1.35	90% (formate)	~150	200		30 h @ 30 mA cm^{-2}	
AI5S8	1	Flow cell	1 M KOH	−0.951	94% (formate)	564.2	600			[91]
AIS2				−0.949	94%	561.3			135 h	

					(formate)				@ 100 mA cm^{-2}	
InP CQDs	0.02	Flow cell	3 M KOH	−1.33	93% (formate)	930	1000		4 h (400 mA cm^{-2}, 1 M KOH)	[92]
Pb_1Cu		Flow cell (/)	0.5 M $KHCO_3$	−0.8	96% (formate)	800	1500		20 h @ 500 mA cm^{-2}	[93]
				−1	92% 80% (formate)	1000 1200				
		solid electrolyte reactor (3)	proton-conducting solid electrolyte	−3.86	94% (formate)	375			180 h @ 100 mA cm^{-2}	
Cu_6Sn_5		Flow cell (0.5)	1 M KOH	−1.8	91% (formate)	1500	2000	57.9	300 h @ 500 mA cm^{-2}	[94]
		Flow cell (0.5)	0.5 M H_2SO_4 + 3 M KCl (pH = 1)	−1.4	96%		1600	52.2	160 h @ 500 mA cm^{-2}	
		Solid state MEA (4)	0.5 M H_2SO_4 + 3 M KCl (pH = 1)	−3.7	~96% @ 100 mA cm^{-2}		500	37	130	

Sn(S)-H	4	Flow cell	0.5 M K_2SO_4 + H_2SO_4		92.15% @ -200 mA cm^{-2} (formate)	730.2	1000		13.5 h @ 400 mA cm^{-2}	[95]
$BiPO_4$-derived		High-pressure H-cell (3 MPa CO_2)	2 M $KHCO_3$	−0.81	90% (formate)	534			10 h @ 200 mA cm^{-2}	[96]
			1 M $KHCO_3$	−0.92		435				
BiO_n cluster		MEA	0.1 M KOH		> 90% (formate)	450	500	44	6 h @ 200 mA cm^{-2}	[97]
BiCu/CF		Flow cell (1)	1 M KOH	−2.41	> 85% (formate)	856	1000		80 h @ 100, 500 mA cm^{-2}	[98]
		MEA		3.2	93.4% (formate)				10 h @ 100, 500, 1000 mA cm^{-2}	
BS/VC	1	Flow cell (1)	0.5 M $KHCO_3$	−1.1	98.6% (formate)	910 mA cm^{-2} @ −1.8 V				[99]
	0.5	Solid state cell (4)	Anolyte: 0.5 M H_2SO_4		90% @ 50 mA cm^{-2} 87% @ 150			33	120 h @ 100 mA	

					mA cm^{-2} (formate)				cm^{-2}	
PD-Bi		Flow cell (1)	1 M KOH		91.9% (formate)	180	600		6 h @ 200 mA cm^{-2}	[100]
Bi^0–$Bi_2O_2CO_3$	1	Flow cell (1)	1 M KOH	−0.95	96% @ -0.25 V (formate)	1900	2000	80	10 h @ 250 mA cm^{-2}	[101]
		Solid-electrolyte cell (4)	anion-exchange resin	4.2	93% (formate)	1100			280 h @ 100 mA cm^{-2}	
Bi-BiO_x nanodots		Flow cell (1)	1 M KOH		96% (formate)	960	1000		20 h @ 300 mA cm^{-2}	[102]
Richly lattice-distorted Bi nanosheet		Flow cell (1)	1 M KOH		91% (formate)	200	800		26 h @ 400 mA cm^{-2}	[103]
Bi-DV		Flow cell (1)	1 M KOH		95.8% (formate)	655	800		11 h @ 200 mA cm^{-2}	[104]
Bi@$Bi_2O_2CO_3$	3	Flow cell (1)	1 M KOH		> 90% (formate)	1200	1400		16	[105]
Bi-ene-NW		Flow cell	1 M KOH	−0.7	91% (formate)	518.7	600		> 18 h @ 200	[106]

								mA cm^{-2}	
			1 M $KHCO_3$	−1.2	90% (formate)			110 h @ 200 mA cm^{-2}	
SAA-Zn_1Bi	1	MEA (5)	5 M KOH	−0.86	> 90% (formate)	1323			[107]
			1 M KOH	−0.75	96.5% (formate)	∼700 mA cm^{-2} @ −0.86 V		250 h @ 400 mA cm^{-2}	
s-SnLi		Flow cell	1 M KOH	−1.2	92% (formate)	1000	1600		[108]
		MEA (5)	0.1 M $KHCO_3$		71±10% (formate)	183 mA cm^{-2} @ −4.6 V		150 h @ 120 mA cm^{-2} > 24 h @ 300 mA cm^{-2}	
Bi/C/30%PTFE	0.65 ± 0.05	Flow cell	1 M KOH	−0.7	86% (formate)	709		6 h @ −6 V	[109]
Sn-ene QDs	2	Custom-designed flow cell (1)	1 M KOH		90.1% (formate)	914	1000	100 h @ 200 mA cm^{-2}	[110]
D-Bi HPE		Flow cell	Catholyte: 3 M KCl	−0.98	> 99.5% (formate)	1010		10 h @ −0.9 V	[111]

			Anolyte: 3 M $KHCO_3$						
POD-Bi		Flow cell (5.6 MPa)	0.5 M $KHCO_3$		91% (formate)		500		[112]
		Flow cell	1 M KOH		93% @ 200 mA cm^{-2} (formate)				
Bi/C-GDE	0.75	MEA	1 M KOH		91.6 % (formate)	274.8	600		[113]
HS2-Bi	1	Flow cell	1 M KOH	−1.1	97% (formate)	667.7		36 h @ 120 mA cm^{-2}	[114]
BOC-NS	2	Flow cell (1)	1 M KOH	−1.55	93% (formate)	930	1000	24 h @ 200 mA cm^{-2}	[115]
Bi-based GDE		Homemade plexiglass cell	pH = 2.94, 0.5 M K_2SO_4		95% (formate)		500	20 h @ 200 mA cm^{-2}	[116]
Sb_2Bi_6	2.8	Flow cell (1)	1 M KOH	−1	> 90% (formate)	734	800	10 h @ 100 mA cm^{-2}	[78]
In_2O_3-C	1	Flow cell (1)	1 M KOH	−3.4	80.5% (formate)	805	1000	15 h @ 200 mA cm^{-2}	[117]
BiS-1	1	Flow cell	1 M KOH		95.2%	1904	2000		[118]

				(formate)				
		0.5 M K_2SO_4		93.9% (formate)	1878			
		0.05 M H_2SO_4 + 0.5 M K_2SO_4		93.2% (formate)	1212			
	MEA	Anolyte: 0.5 M KOH		> 90% (formate)	630	700	150 h @ 200 mA cm^{-2} (0.5 M KOH)	
Li-Bi_2S_3	Coelectrolysis cell of anodic MOR and cathodic CO_2RR	1 M KOH	3.14	86.05% (formate)		1600	200 h @ 200 mA cm^{-2}	[119]
CeO_2-Cu_{SAC}	Flow cell (1)	1 M KOH		70.3% (CH_4)	281.2	500	70 h @ 400 mA cm^{-2}	[120]
Al_2O_3-CuNPs	Flow cell (1)	1 M KOH		81.3% (C_{2+})	731.7	1000	70 h @ 400 mA cm^{-2}	
Cu-NC@CuPc-COF	Flow cell	1 M KOH	−1.2	74±3% @ −1 V (CH_4)	538 ± 31		> 70 min @ −1 V	[121]
COF-NS	Flow cell (1)	0.5 M K_2SO_4		64% (CH_4)	296	500	9 h @ 200	[122]

									mA cm^{-2}	
Cu_2O@RF		Flow cell (1)	1 M $KHCO_3$		51% (CH_4)	561	1100			[123]
us-Cu-np	5	Flow cell (1.05)	1 M KOH	−1.2	68% (CH_4)	475			8	[124]
Cu NC		Flow cell	1 M KOH + 2 M KCl	−1.66	85% (CH_4)	1200	1500		800 min @ 200 mA cm^{-2}	[125]
CuBIM		Flow cell	1 M KOH		51.7% (CH_4)	672	1600		7 h @ 1300 mA cm^{-2}	[126]
Co_1Cu	1	Flow cell (0.6)	0.5 M $KHCO_3$		60% (CH_4)	482.7	800		10 h @ 400 mA cm^{-2} for 4 min followed by 1 mA cm^{-2} for 1 min	[127]
OD-$La_{0.10}$-CuO_x	1	Flow cell	1 M KCl		80% (C_{2+} with 51.8% C_2H_4)	240	500	23	16 h @ 300 mA cm^{-2}	[128]

			1 M KOH		61.5% (CH_4)	270	500	28.2	8 h @ 400 mA cm^{-2}	
CN/Cu_2O/CN		Flow cell	1 M KOH		61% (CH_4)	561	1000		12 h @ 400 mA cm^{-2}	129
CoTAPc/GCNT	1	Flow cell	1 M KOH 1 M $KHCO_3$ 0.5 M K_2SO_4		12.8% 10.5% 12.1% (CH_3OH)		800			130
Cu-Pt_{NPs}		Flow cell	1 M KOH	−1.2	57.7% (CH_4)					131
Cu-Pt_1		Flow cell	1 M KOH		70.4% (C_{2+})					
Cu-Pt_{NPs}		MEA (5)	0.5 M KOH		58.9% (CH_4)		400		16 h @ 200 mA cm^{-2}	
Cu-Pt_1		MEA (5)	0.5 M KOH		71.8% (C_{2+})				28 h @ 200 mA cm^{-2}	
Cu-mono		Flow cell (1)	0.05 M H_2SO_4 + 2.5 M KCl		82% (C_{2+}) 62% (C_2H_4)		500		3.5 h @ 200 mA cm^{-2}	132
Cu-btca MOF		Flow cell (1)	Anolyte: 0.5 M H_2SO_4 Catholyte: 3 M KCl +	−2.5	81.9% (C_{2+} with 51.2% C_2H_4)	245.7	600		350 min @ 300 mA	133

			0.05 M H_2SO_4						cm^{-2}	
I-OD-Cu		Flow cell	1 M KOH	−0.84	79% (C_{2+} with 49.1% C_2H_4, 22.1% C_2H_5OH)	340	500		30 h @ −1.05 V	[134]
Cu		Flow cell	3 M KCl + 0.05 M H_2SO_4		82% (C_{2+})	328	500	23		[135]
4.73 %Cd-CuO		Flow cell	1 M KOH	−2.2 V vs. Ag/Ag^+	56.64% (C_{2+})	339.84	700		2	[136]
Cu@F-MC		Flow cell	1 M KOH		64% (C_{2+}) 40% (C_2H_5OH)	320 217.5	500			[137]
		MEA (4)	1 M $KHCO_3$						70 h (0.1 M $KHCO_3$)	
CuAg-4.33%		Flow cell	1 M KOH		77.9±0.8% (C_{2+})	333.5	500		40 h @ 300 mA cm^{-2}	[138]
$Sc_{0.09}$-Cu_2O		Flow cell	1 M KOH		71.9% (C_{2+})	575.2	800		5 h @ 600 mA cm^{-2}	[139]
$Cu_2P_2O_7$	1±0.1	MEA	0.1 M KOH	3.36	73.6% (C_{2+})	263	600		30 h @ 200 mA cm^{-2}	[140]
Sn_1Cu-SAA	1	Flow cell	1 M KOH		79.3% (C_{2+})	701	1000		16 h @ 800	[141]

								mA cm^{-2}	
Cu/CeZr		Flow cell	Catholyte: 1 M KCl Anolyte: 1 M KOH	−1.9	67.2% (C_{2+})	413			[142]
		MEA		3.7				18 h @ 300 mA cm^{-2}	
AgSA-Cu/Cu_2O		Flow cell	1 M KOH		90.2% (C_{2+})	426.6		10 h @ −1.6 V	[143]
Cu_{PEG}		Flow cell	1 M KOH		90.3% (C_{2+})	451.5	800	24 h @ 500 mA cm^{-2}	[144]
CuO@K_2CO_3	1	Flow cell	1 M KOH		82.8±2.2% (C_{2+})	1656	2200	80 h @ 400 mA cm^{-2} 80 h @ 2000 mA cm^{-2}	[145]
		MEA	1 M KOH		81.4±5.9% (C_{2+})	1302.4	30.9% @ 1000 mA cm^{-2}	110 h @ 1000 mA cm^{-2}	
In_2O_3@K_2CO_3					85.2±2.9%	426	500		

					(HCOOH)					
SnO_2@K_2CO_3					88.0±1.6% (HCOOH)	704	800			
Bi_2O_3@K_2CO_3					95.4±0.3% (HCOOH)	1144.8	1200			
Cu_3N_x-50-μA	1	Flow cell (2*0.5)	1 M KOH	−1.15	81.7±2.3% (C_{2+} with 56±1% C_2H_4) 45±3.7%	307±9 405±33	900		10000 s @ 350 mA cm^{-2}	[146]
Cu_2O–Cu^0	1.5	MEA	0.1 M $KHCO_3$	3.8	80% @ 2.7 kPa (C_{2+})	800	1000		350 h @ 250 mA cm^{-2}	[147]
Pyr-Cu_2O/Cu		Flow cell	1 M KOH	−1	85.6% (C_{2+})	454	530		8	[148]
$Cu_{1.7}$ Clu/GAs		Flow cell	1 M KOH	−1.1	68.7% (C_2H_5OH)	339.8	500		60	[149]
AgCu SANP	0.5	Flow cell	1 M KOH	−0.65	94±4% (C_{2+})	677 ± 57	720 ± 61		9.75	[150]
Cu@BN	1	Flow cell (0.5*2)	Anolyte: 0.5 M H_2SO_4 Catholyte: 3 M KCl	−2.5	83.4% (C_{2+})	1000	1400		5 h @ 1200 mA cm^{-2}	[151]
HEB-Cu NPs		Flow cell	1 M KCl		88.62% (C_{2+})	480.5	600	43.3%	10 h @ 300 mA cm^{-2}	[152]
		MEA (1)	0.1 M KOH		86.14% (C_{2+})	450	500	28% (full-cell)	50 h @ 200 mA cm^{-2}	

Cu-TAPT		Flow cell	1 M KOH	−0.8	84.9±1% (C_{2+} with 54.3±3% C_2H_5OH)	233 (ethanol)			30	[153]
$CuO/AgIO_3$		Flow cell	0.5 M K_2SO_4		82% (C_{2+}) 47.9% (C_2H_4)	1024 574.8	1300		8 h @ 900 mA cm^{-2}	[154]
Cu HPE		Custom-made electrolytic cell	0.05 M H_2SO_4 + 3 M KCl (pH 0.71)		73.4% (C_{2+})	2200	3000	29.04	100 h @ 2000 mA cm^{-2}	[155]
Cu HFPE		Two compartment electrolysis cell	Anolyte: 0.5 M K_2SO_4 + 0.05 M H_2SO_4 Catholyte: 0.05 M H_2SO_4 + 3 M KCl		84% (C_{2+}) @ pH = 1, 2, 3	2500	4300		240 h @ at 3000 mA cm^{-2}	[156]
0.7% Mo_1Cu	1	Flow cel	1 M KOH		84% (C_{2+})	1330	1800		40 h @ 800 mA cm^{-2}	[157]
NP Cu		microfluidic flow electrolyzer	1 M KOH		80% at 300 mA cm^{-2} (C_{2+})					[158]
	0.2-0.5			−1.52	> 70% (C_{2+})		1000			
300 nm Cu layer on a		Flow cell	1 M $KHCO_3$	−1.8	77% (C_{2+})	450	575			[159]

GDL								
PANI/CuO NSs-25	0.88	Flow cell	1 M KOH		61% (C_{2+}) 50% (C_2H_4)	244.0 200.1	600	[160]
high-CN Pot-Cu	3	Flow cell (0.5*2)	1 M KOH	−1.27	82.5% (C_{2+})	514.3	15	[161]
low-CN Pul(3)-Cu				−1.87	56.7% (CH_4)	234.4	15	
Cu-DAT		Flow cell (0.5*2)	1 M KOH		85.7% (C_{2+})		800	24 h @ 300 mA cm^{-2} [162]
P-Cu_2O-240	0.5	Flow cell (1)	1 M KOH		75.3 ± 3.1% (C_{2+})		1200	20 h @ 500 mA cm^{-2} [163]
Cu_2O-2	~0.4	Flow cell (2)	2 M KOH		~79% (C_{2+})	692 ± 34	1000	3 h @ 700 mA cm^{-2} [164]
La-Cu HS	1	Flow cell (1)	0.05 M H_2SO_4 + 3 M KCl		86.2% (C_{2+}) @ 900 mA cm^{-2}	813 @ 1000 mA cm^{-2}	1000	40 h @ 900 mA cm^{-2} [165]
OD-Cu-HIL PNPs	0.5	Flow cell	1 M KOH		85.1% (C_{2+})	779	1000	14 h @ 400 mA cm^{-2} [166]
DPVP-CuNP	0.24	Flow cell (4)	0.5 M KOH	−0.8	> 80% (C_{2+})	640	800	10 h @ 800 mA cm^{-2} [167]
Cu-BIF/Cl	2.5	Flow cell (1)	1 M KOH	−1.75	72.12% (C_{2+})	539	1147.1	50 [168]

Cu_2O/Al_2O_3		Flow cell			74.7% (C_{2+}) 40.1% (C_2H_5OH)	1016.4	1600	34	82 h @ 500 mA cm^{-2}	[169]
CuBtz		Flow cell	1 M KOH	−1.6	61.6% (C_{2+})	938			> 50	[170]
Cu-CuI	2±0.1	Flow cell	1 M KOH	−1 −0.87	48% (C_2H_4) 71% (C_{2+})	591			85 h @ 550 mA cm^{-2}	[171]
C/Cu/HKUST-1/PTFE	0.6	Flow cell	1 M KOH	−1.3	48% (C_2H_4)	491 mA cm^{-2} @ 4.3 V	1200			[172]
		MEA (5)	0.1 M $KHCO_3$	3.8	54% (C_2H_4)	220	255	∼15% (0.1 M $KHCO_3$) ∼25% (1 M KOH)	65 h @ 250 mA cm^{-2}	
Tension-strained Cu		Flow cell	0.05 M H_2SO_4 1 M KCl		79% (C_2H_4)	157.6	500		100 h @ 400 mA cm^{-2}	[173]
CeO_2/CuO NSs		Flow cell	1 M KOH		66.6% (C_2H_4)	467	800		6 h @ 600 mA cm^{-2}	[174]
Cu@PAAz	1.5	Flow cell	1 M KOH		84.5% (C_{2+}) 68.9% (C_2H_4)	845 689	1200		10 h @ 600 mA cm^{-2}	[175]

Cu-5	0.5	Flow cell	1 M KOH	−0.93	81.5% (C_2H_4)	1100		42.2% (half)	50 h @ 600 mA cm^{-2}	[176]
Cu_xO_y/CN		Flow cell (1)	1 M KOH		44% (C_2H_4)	220	500		21 h @ 300 mA cm^{-2}	[177]
p-Cu		Flow cell	Catholyte: 1 M KCl Anolyte: 1 M KOH	−1.28	90% (C_{2+}) 72% (C_2H_4)	450 (C_{2+}) 359 (C_2H_4)	700		105 h @ 500 mA cm^{-2}	[178]
		MEA (5)	0.1 M $KHCO_3$	3.14	64% (C_2H_4)	480	1000	23.4	77 h @ 800 mA cm^{-2}	
TA−Cu	0.22	Flow cell	1 M KOH	−1.2	63.6% (C_2H_4)	497.2			10	[179]
Ag-Cu_2O-0.10	1	Flow cell	Catholyte: 3 M KCl Anolyte: 3 M KOH		73.6% (C_{2+}) 55% (C_2H_4)	429.1 (C_2H_4)	700		9 h @ 600 mA cm^{-2}	[180]
			3 M KOH		67.48% (C_2H_4)					
CuNFC	2	Flow cell (1)	1 M KOH		65.7% (C_{2+})	394.2	1000		7000 s @ 600 mA cm^{-2}	[181]
		MEA (1)	1 M KOH						10 h @ −3 V	

L_{60}–Cu		Flow cell	1 M KOH		57% (C_2H_4) 78.32% (C_{2+})	456	900			[182]
CuNCN	0.7	Flow cell (1)	1 M KOH	−1.4	77% (C_2H_4)	400			15	[183]
	2	AEM-MEA		3.6	66.8% (C_2H_4)				80	
ImF-Mo_3P		Custom-designed flow electrolyser (5)	1 M KOH	−0.8 −0.9 −1	91% (C_3H_8) 76% 64%	361	517	49	100	[184]
$Cu_{0.9}Zn_{0.1}$	1-4.5	Flow cell	Catholyte: 3 M KCl + 1 M H_2SO_4 Anolyte: 0.5 M H_2SO_4 (pH=4)		69 ± 2%		600	> 30%		[185]
			Catholyte: 3 M KCl + 1 M KOH Anolyte: 1 M $KHCO_3$ (pH=7)		81 ± 2%					
			0.75 M KOH (pH=13.5)		91 ± 2% (C_{2+})					
		MEA		−3.7	90% (C_{2+}) 70% (C_2H_4)			28-32%	> 150 h @	

					@ 800 mA cm^{-2} 30 s and 1 mA cm^{-2} 30 s				150 mA cm^{-2}	
CIBH	3.33	Flow cell	7 M KOH		75% (C_2H_4)	1340	1500	46 ± 3% (half) 20% (full)		[186]
		MEA	0.1 M $KHCO_3$						60	
$[Cu_3(\mu_3\text{-}OH)(\mu_3\text{-}trz)_3(OH)_2(H_2O)_4]$	0.25	Flow cell	1 M $KHCO_3$		80% (C_{2+} with 50% C_2H_4)	224	500		36 h @ 280 mA cm^{-2}	[187]
CuO/Ni $SAs_{1.82}$	1.5	Flow cell	1 M KOH	−0.892	81.4% (C_{2+}) 54.1% (C_2H_4) 28.8% (C_2H_5OH)	1120.8 811.5 432	1500		3 h @ 1000 mA cm^{-2}	[188]
		MEA (4)	1 M KOH	3.521~3.567	82.7% (C_{2+}) 52% (C_2H_4) 26.4% (C_2H_5OH)		3000 (total)		25	
Cu(100)-rich films (HRS-Cu)	0.9	Flow cell	2 M KOH		86.5% (C_{2+} with 58.6% C_2H_4)			36.5	4.5 h @ −0.75 V	[189]
		MEA (4)	0.1 M $KHCO_3$		55.8% (C_2H_4)				4.5 h @ 120 mA cm^{-2}	

		MEA (25)			50.9% (C_2H_4)	244.32	12000 (480 mA cm^{-2})		3.5 h	
cCOF/PFSA		MEA (4)	1 M KOH	−3.09	90.3% (C_{2+}) 70.5% (C_2H_4)	680.4 493.5	900	25.9 17.2	760 h @ 200 mA cm^{-2}	[190]
		MEA (25)	1 M KOH	−3.05	55.2% (C_2H_4)		20 A (total)	21.2		
		Cell stack (six 10 cm^2 MEA)	1 M KOH	−15.7	50.5% (C_2H_4)		600			
3D Cu–CS-GDL		Flow cell	1 M KOH	−0.87	88.2% (C_{2+}) 51.4% (C_2H_5OH)	793.8 462.6	1000		24 h @ 900 mA cm^{-2}	[191]
CeO_2/CuO		Flow cell	0.5 mM H_2SO_4 and 3 M KCl	−1.5	89.8% (C_{2+}) 48.5% (C_2H_5OH)	344			25 h @ −1.53	[192]
Cu=N	1	Flow cell	1 M KOH	−0.82	75% (C_{2+}) 45% (C_2H_5OH)	406				[193]
		MEA (5)	0.1 M $KHCO_3$	−4.17 ± 0.12					300 h @ 400 mA cm^{-2}	
1.83%F-Cu_2O OIHs	1	Flow cell (1)	3 M KOH	−1.8	55.2% (C_2H_5OH)	210	600	29.1		[194]
		MEA			49.6%				60 h @ 100 mA	

									cm^{-2}	
Commercial Cu		Flow cell	1 M KOH		37.5% (C_2H_5OH)	300	800			[195]
Au–Cu Janus nanocrystals (Au-Cu_I)	2 ± 0.1%	Flow cell	1 M KOH	−0.87	72.1% (CH_3OH)	107			10 h @ 630 mA cm^{-2}	[196]
Au–Cu_{II}				−0.78 −0.83	67.3% (C_{2+}) 78.1% (C_2H_5OH)	431			7.5 h @ 630 mA cm^{-2}	
Au–Cu_{III}				−0.87	80% (C_{2+}) 63% (C_2H_4)	576.1			10 h @ 600 mA cm^{-2}	
Cu_2O@Cu−TCPP(Co)	0.6	Flow cell	1 M KCl		69 ± 4% (C_{2+}) 54 ± 2% (C_2H_4)	 270 ± 8 (C_2H_4)			20 h @ 300 mA cm^{-2}	[197]
Cu NCs@Cu-BTC		Flow cell (0.5*2)	Catholyte: 1 M KCl Anolyte: 1 M KOH		92.3% (C_{2+})	276.9	500		10 h @ 300 mA cm^{-2}	[198]
		MEA (1)	0.1 M KOH		90.1% (C_{2+})	360.2	500	31.7	50 h @ 200 mA cm^{-2} (0.0.1 M KOH)	

		MEA (25)	0.1 M KOH		> 80% (C_{2+})	7.97 A	12.5 A		
Pd-Cu		Flow cell	1 M KOH		80.8% (C_{2+})	> 980	1600	20 h @ 800 mA cm^{-2}	[199]
Cu/Pd-1%	1.75	Flow cell	1 M KOH		66.2% (C_{2+})	463.2	700	5 h @ 500 mA cm^{-2}	[200]
Cu/PPy		Flow cell	1 M KOH		80% (C_{2+})	560	1000	50 h @ 200 mA cm^{-2}	[201]
AEI-OD-Cu	CuO: 0.52 AEI: 5 µL mL^{-1}	Flow cell (1)	1 M KOH	−0.66	81% (C_{2+} with 62% C_2H_4 + 18.1% C_2H_5OH)	647	1000	9 h @ 400 mA cm^{-2}	[202]
	CuO: 0.52 AEI: 10 µL mL^{-1}				85.1% (C_{2+} with 65% C_2H_4)				
Cu–Au/Ag nanoframes	0.05	Flow cell (1)	1 M KOH	−0.65	77±2% (C_{2+})	308		31 h @ −1.2 V	[203]
Cu@PIL	1	Flow cell (0.5*2)	0.5 M K_2SO_4 + H_2SO_4 (pH=1.8)	−1.71	82.2% (C_{2+}) 75.8%	822 1137 1140 (C_{2+} with 570 C_{2+}	1500	34.5%	8 h @ 600 mA cm^{-2}	[204]

					alcohol)			
Cu/Ag s-GDE (1.00 : 0.05)	Cu: 0.4 Ag: 0.04	Flow cell	0.5 M KOH	3.28	85.7% (C_{2+})			[205]
Cu/Ag s-GDE (1.00 : 0.25)				3.32	84.8% (C_{2+})			
Cu/Ag s-GDE (1.00 : 0.50)				3.37	83.9% (C_{2+})			
Cu/Ag s-GDE (1.00 : 0.75)				3.4	82.5% (C_{2+})			
Cu/Ag s-GDE (1.00 : 1.00)				3.44	80.6% (C_{2+})			
Cu GDE				3.59	70.3% (C_{2+})			
Cu/Fe-N-C s-GDE	Cu: 0.8 Fe-N-C: 0.8	Flow cell	0.5 M KOH	2.89	87.3% (C_{2+})	437.2	24 h @ 680 mA cm^{-2} 120 h @ 430 mA cm^{-2}	[205]
		MEA	0.1 M $KHCO_3$	4	86% (C_{2+}) 47% (C_2H_4)	299	80 min @ 500 mA cm^{-2}	
Doubly loaded Cu/Fe-		Flow cell	0.5 M KOH	3.38	89.3% (C_{2+})	1071.7	16.9	

N-C s-GDE					63.5% (C_2H_4)	761.7				
$Cu_2Mg(111)$	1	Flow cell (1)	1 M KOH		76.2 ± 4.8% (C_2H_5OH)	720 ± 34	1500		15 h @ 600 mA cm^{-2}	[206]
$dCu_2O/Ag_{2.3\%}$	0.44	MEA	1 M KOH	−0.87	48.1% (C_2H_5OH)	326.4	800	22.3	12 h @ 800 mA cm^{-2}	[207]
Cu_3Sn	3	MEA (5)	1 M KOH	3	40% (C_2H_5OH)	360		17	48 h @ 900 mA cm^{-2}	[208]
$Ag_{0.015}In_{0.985}Se_{0.734}$ nanosheets	0.8	Flow cell	1 M KOH	−0.6 −1	79.3% 61.9% (C_2H_5OH)	164.7 458.2	740.3		14	[209]
		MEA (1)	1 M KOH	3 4.5	68.7% 55.3% (C_2H_5OH)	186.6 392.3	710.0	26.1	22	
CuAgNb	0.5	microfluidics flow cell (1)	1 M KOH		～75% (C_{2+})		600			[210]
Cu_2O/Ag		Flow cell	1 M $KHCO_3$		80.8% (C_{2+})	565.6	1200			[211]
wr-Cu	1	Flow cell	1 M KOH	−0.91	85.8% (C_{2+}) 49.7% (C_{2+} alcohol)	397.6	800		15 h @ 800 mA cm^{-2}	[212]
Nanoporous Cu	1	Flow cell	1 M KOH	−0.67	62% (C_{2+})	653			> 2 h @ 200 mA	[213]

									cm^{-2}	
Cu-nanorod(nr)/CC3	1	Flow cell (1.05)	1 M KOH	−0.9	76.1% (C_{2+})	1293.7	1700		1	[214]
E-SC/Cu_2O	1	Flow cell	2 M KOH	−0.9 −1.1	88.1% (C_{2+}) 80%	825.94 1239.92			55 h @ 500 mA cm^{-2}	[215]
CuGa	1	Flow cell	1 M KOH	−1.07	81.5% (C_{2+})	900	1100		12 h @ 900 mA cm^{-2}	[216]
Cu CF	3	Flow cell (1)	1 M KOH 3 M KOH	−1.31 −0.86	>80% (C_{2+}) 86.9% (C_{2+})	565.7 608.2	700			[217]
		MEA (4)	1 M KOH	−2.8	90.4% (C_{2+}) 48.1% (C_2H_5OH)	341.6	800	34.7	400 h @ 200 mA cm^{-2}	
		MEA (25)	1 M KOH	−2.88	48.1% (C_2H_5OH)		400	19.2	10 h @ 400 mA cm^{-2}	
		Solid-electrolyte reactor	proton-conducting electrolyte + 0.5 M H_2SO_4	−3.9	44.4% (C_2H_5OH)	355.2	800		50 h @ 600 mA cm^{-2}	
N-Cu	0.5	Flow cell (1)	1 M KOH	−1.15	73.7% at 1100 mA cm^{-2} (C_{2+})	909	1500		6 h @ 400 mA cm^{-2}	[218]
F-Cu	0.25±	Flow cell	0.75 M KOH	−0.89	≥80%	1280	1600		40 h @	[219]

	0.05				(C_{2+} with 65%C_2H_4+ 12%C_2H_5OH)			400 mA cm^{-2}	
			2.5 M KOH	−0.54	84% (C_{2+} with 60%C_2H_4+ 16%C_2H_5OH)	672			
Cu-GDL		Gas diffusion flow reactor	1 M KCl + 1 M HCl + 1 M KOH		87% (C_{2+})	1600	1800	10 h @ 600 mA cm^{-2} 30 h @ 200 mA cm^{-2}	[220]
Cu_2O-Cu nanocubes		Flow cell	1 M KOH	−1.27	77.4% (C_{2+})	449.4	700	5 h @ 500 mA cm^{-2}	[221]
Porous Cu	0.6	Flow cell	1 M KOH	−0.67	62% (C_{2+})	653		2 h @ 400 mA cm^{-2}	[213]
Ni SAC + Cu-R		Flow cell	1 M $KHCO_3$	−1.4 to −1.5	90% (CO)		600	14 h @ 500 mA cm^{-2}	[222]
CuO nanosheets	1.75	MEA (4)	0.1 M KOH		82.7%		900		[223]

					(C_{2+} with 52.5% C_2H_4)				
		MEA (100)			55% (C_2H_4)	330	1000		
		MEA stack (four 100 cm^2)			50% (C_2H_4)	200	1000		
RhCu	0.35	Flow cell	1 M KOH	–0.65±0.01 −0.66	74±3% (C_{2+}) 61.2% (C_2H_4)	653	1000	35 h @ 1000 mA cm^{-2}	[224]
		MEA		3.8	58.2% (C_2H_4)	590		37.2% (half) 17.6% (full)	
ZnO/RhCu cs-GDE		MEA		3.7	85.4% (C_{2+}) 68.8% (C_2H_4)	1256 1012		21.4% (full)	
Cu-poly-1	1	MEA	1 M $KHCO_3$	−3.98	71.08% (C_{2+}) 41.8% (C_{2+})	355.4 229.9	550		[225]
Cu/ionomer	3.33	Flow cell	7 M KOH	−0.68	87.5% (C_{2+})	1023.75	1550	60 h (−3.90 V cell voltage, 0.1 M $KHCO_3$)	[186]
				−0.88	79.5% (C_{2+})	1089.15			
				−0.91	78.2% (C_{2+})	1212.1			
T-Cu	1	Flow cell	1 M KOH	−4.1±1.2	78% (C_{2+} with 67%	1810	4000	42	10 h @ 100	[226]

					C_2H_4 + 5% C_2H_5OH)				mA cm^{-2}	
		MEA (5)	0.1 M $KHCO_3$	−3.78±0.21	50±11% (C_2H_4)	120			> 400 h @ 200 mA cm^{-2}	
Cu-Cl-Cs	1	Flow cell (1)	1 M KOH	−4.24	35.4 ± 0.9% (C_2H_5OH)	2124 ± 54	8000		4800 s @ 4000 mA cm^{-2}	[227]
				−1.34	45.4 ± 2.3% (C_2H_5OH)	1816 ± 92				
				−4.24	67.5 ± 5.4 % @ 4000 mA cm^{-2} (C_{2+})	3330 ± 252 @ 6000 mA cm^{-2}			20 h @ 1000 mA cm^{-2}	
$Li_{2-x}CuO_2$ -10-	1	Flow cell (1)	1 M KOH	−3.3	45.4 ± 2.3% (C_2H_5OH)	706 ± 32 @ 2000 mA cm^{-2}	2000			[228]
				−0.85	90.6 ± 7.6% (C_{2+} with 50.9 ± 3.6% C_2H_4, 27.1 ± 2.5% C_2H_5OH, 10.1 ± 1% CH_3COOH)				10	
BaO/Cu	1	Flow cell (2*2)	1 M KOH	−0.75	61% (C_{2+} alcohols)	244	500	30	20 h @ 400 mA	[229]

									cm^{-2}	
6.2% Pd-Cu/PTFE		Flow cell	0.5 M K_2SO_4		89 ± 4% (C_{2+})	440	750		4.5 h @ 500 mA cm^{-2}	[230]
Cu-CuI composite	2.0±0.1	Flow cell	1 M KOH	−1	66% (C_{2+})	591	894		85 h @ −0.8 V	[171]
Mg−Cu		Flow cell	1 M KOH	−0.77	80% (C_{2+})	520	1000		48 h @ 650 mA cm^{-2}	[231]
Cu(100)-rich Cu	1	MEA	0.1 M $KHCO_3$	−3.8	83% (C_{2+})	415	500	25	60 h @ 300 mA cm^{-2}	[232]
n-butylamine modified Cu		Flow cell (1.05)	0.5 M K_2SO_4 + 0.005 M H_2SO_4		81.8% (C_{2+}) 52.6% (C_{2+} alcohols)		410			[233]
		MEA (2*2)	0.1 M $KHCO_3$	−4.2	43.7% (C_{2+} alcohols)		340		80	
4.4-shell Cu	1	Flow cell (1)	1 M KOH		58.7 ± 3.0% (C_{2+})	528.3	900		11 h @ 300 mA cm^{-2}	[234]
p-CuO_x-Cu NWs-Ag	1	Flow cell (1*0.5)	1 M $KHCO_3$	−1.48	76% (C_{2+})	380	500			[235]
r-CuAg		Flow cell	Catholyte: 0.05 M H_2SO_4 + 3 M KCl Anolyte: 0.05	−1.9	～80% (C_{2+}) 56.5% (C_{2+} oxygenates)	684 (C_{2+}) 480 (C_{2+} oxygenates)			5 h @ 350 mA cm^{-2}	[236]

			M H_2SO_4						8 h @ pulsed CO_2 electrolysis (350 mA cm^{-2} for 100 s and 1 mA cm^{-2} for 1s)	
3-shell HoMSs		Flow cell	0.5 M $KHCO_3$	−0.88	77% (C_{2+})	513.7±0.7			8 h @ 300 mA cm^{-2}	[237]
Ga_1-F/Cu_2O		Flow cell	1 M KOH		72.8±3.2% (C_{2+})	456	800		10 h @ 600 mA cm^{-2}	[238]
PT/Cu		Flow cell	2 M KOH		87.4% (C_{2+})		2000		150 h @ 200 mA cm^{-2} in 1 M KOH	[239]
		MEA	1 M KOH		> 80% (C_{2+})		1200	21		
PFSA@Cu/PTFE	1	MEA	0.1 M $KHCO_3$		84% (C_{2+})	790	1100	23	100 h @ 250	[240]

									mA cm^{-2}	
Ni SAC/Cu(111)	2	Flow cell (0.5)	1 M $KHCO_3$		60% (C_2H_4)	372	600		14 h @ 500 mA cm^{-2}	[222]
SS-Cu	1	Flow cell (1)	1 M KOH	−0.58	∼80% (C_2H_4)	∼568				[241]
	1	pure-H_2O-fed (alkali-cation-free) MEA (1)			52% (C_{2+})		500	18.2		
		Electrolyser stack (six MEA, 30)		−4.4 V for each set of MEA cells	∼50% (C_2H_4)		10000 (total)		1000	
Cu_2O-Cu nanocubes	1	Flow cell	1 M KOH	−1.27	55% (C_2H_4)	449.4 (C_{2+})	700		5 h @ 500 mA cm^{-2}	[221]
$La(OH)_3$-modified Cu		Flow cell	1 M KOH	−1.25	71.2% (C_{2+} with 40.8% C_2H_4)	712.6	1200		8 h @ 1000 mA cm^{-2}	[242]
GDE-Nafion	1	Flow cell (1)	1 M KOH	−2.75	75.2% (C_{2+})	968.6	1160		12 h @ 300 mA cm^{-2}	[243]
Cu-FEP	0.4	Flow cell	1 M KOH	−0.76	∼77% (C_{2+})	> 600	800		16 h @ 200 mA cm^{-2}	[244]

CuNNs		Flow cell (1)	3 M KCl		90.69±2.15 % (C_{2+})	1270	1600		8 h @ 800 mA cm^{-2} 5 h @ 1200 mA cm^{-2}	[245]
CuO-C(O)	1	Flow cell	1 M KOH		～77.4% (C_{2+} with ～ 60% C_2H_4)	387	600		10 h @ 500 mA cm^{-2}	[246]
Cu-based GDE	1	Flow cell (1)	1 M KOH	−1.44	65.1 (C_{2+})	885	1360			[247]
					51.2 (C_2H_4)	697				
Fe9.0%-a/c-SnSe/$SnSe_2$	0.4	Flow cell (0.5*0.5)	1 M KOH	−0.6	62.7% (C_2H_5OH)	239	893.9		40	[248]
		MEA (1)		3	63.5	201.2	719.3	24.1	20	
				4	60	425.1				
Cu-DMAP/P-H		Flow cell	1 M KOH	−0.59	47% (C_2H_5OH)		500		24 h @ 150 mA cm^{-2}	[249]
Cu_5Ga_1		Flow cell	1 M KOH		~83% (C_{2+} with ～53% C_2H_4) @ 50% CO_2		500			[250]
					> 80% (C_{2+})		1500		65 h @ 500 mA cm^{-2}	

		MEA (1)	1 M KOH		80% (C_{2+})		1500			
K-F-Cu-CO_2	1	Flow cell (1)	1 M KOH	−0.53	52.9% (C_2H_5OH)	423	1200		12 h @ 800 mA cm^{-2}	[251]
				−0.68	43.9% (C_2H_5OH)	439				
Cu		Flow cell	0.01 M H_2SO_4 in seawater		42.4% (C_{2+})	308	1200		10800 s @ 100 mA cm^{-2}	[252]
Cu-CuI	2.0±0.1	Flow cell	1 M KOH	−1	40% (C_{2+})	591	1833			[171]
LSC-D520	0.5	MEA (2*2)		3.57	89.4 ± 0.69% (C_{2+})	536 ± 4.14	700	28.6	10 h @ 2000 mA	[253]
CuONPs	1.7	In-house-built three-compartment electrochemical cell	1 M KCl	−1.76 V vs. Ag/AgCl	40% @ −1.69 V vs Ag/AgCl (C_{2+})	1700	2400	7.2	2 h @ 1600 mA cm^{-2}	[254]
Cu-bpa	1	Flow cell	1 M KOH	−0.83	58.2% (CH_4)	232.8	500			[255]
Cu-bpe				−0.85	65.9% (C_2H_4)	197.7	500			
Cu-PzH		Flow cell	1 M KOH	−1	60% (C_2H_4)	346.46				[256]
[Cu_2(ophen)$_2$] (Cuophen)		Flow cell	1 M KOH		55% (C_2H_4)	319	580		50 h @ −1.4 V	[257]
Cu(OH)BTA	1	Flow cell	1 M KOH	−0.87	57% (C_2H_4) 73% (C_{2+})	285	500			[258]
		MEA (4)	0.1 M $KHCO_3$	3.8	54% (C_2H_4)	130		31.3	67 h @	

								(half)	950 mA cm^{-2}	
Cu@AIL	1	Flow cell	1 M KOH	−1.31	71.6% (C_{2+})	1290	1800		18 h @	[259]
					81.4% (C_{2+} with 34.8% C_2H_4 + 38.6% C_2H_5OH)		900		600 mA cm^{-2}	
ED-Cu nanoribbon	1.2	Flow cell (1)	1 M KOH		82.1% (C_{2+} with 67.2% C_2H_4)	505 (C_2H_4)	700		40 h @ 700 mA cm^{-2}	[260]
CuO/Al_2CuO_4-23	0.6	Flow cell (1)	1 M KOH	−2.031	70.1% (C_2H_4)	421	1000			[261]
Cu_2		Flow cell	1 M KOH		51% (C_2H_4)	469.4				[262]
Cu-NN		MEA	0.5 M $KHCO_3$	−3.55	83% (C_2H_4)		1000	39.6	120	[263]
Cu-NN+PFSA ionomer					89 ± 3% (C_2H_4)	536		30.5		
Abrupt Cu interface	1	Flow cell	10 M KOH	−3.8	66% (C_2H_4)	495	750		150	[264]
TS-Cu	1	Flow cell	1 M KOH	−0.9	72% (C_2H_4)		1000		100 h	[265]
		MEA	1 M KOH	3.5	72% (C_2H_4)	576	1000		230 h	
Cu tuned with molecular		Flow cell (1)	1 M $KHCO_3$	−0.83	72% (C_2H_4)	232		20		[266]
		MEA (5)	0.1 M $KHCO_3$	−3.65	64% (C_2H_4)	384			190	
cAA-CuNW		Flow cell	1 M KOH	−1.55	60.7% (C_2H_4)	539	888		8 h @ 300 mA	[267]

									cm^{-2}	
Cu_{TPA}		Flow cell	3 M KOH	−1.25	90.9% (C_{2+})	486.1			10	[268]
L-Cu_xO-HC		Flow cell	1 M KOH	−2.8	81% (C_{2+})	665.9	900		12 h @ 600 mA cm^{-2}	[269]
m-CuO		Flow cell (1)	1 M KOH	−1.5	77.2% (C_{2+}) 55% (C_{2+} alcohol)	209 (C_{2+} alcohol)			20000 s	[270]
c-CuO					76% (C_{2+}) 52% (C_2H_4)					
C-Cu_2O NPs	1	Flow cell (3*1)	1 M KOH		76.9% (C_{2+}) 57.4% (C_2H_4)	615.2 459.2	900		20 h @ 300 mA cm^{-2}	[271]
Cu-QAPPT	0.25	MEA	0.1 M $KHCO_3$	3.68	48% (C_2H_4)	308	1000		5 h @ 200 mA cm^{-2}	[272]
				3.54	49.7% (C_2H_4)	420		16.8		
CAL-modified Cu		Flow cell (1, 50 sccm CO_2)	1 M H_3PO_4 + 3 M KCl		40% (C_{2+})	480	1500		/	[273]
		Slim flow cell (1, 50 sccm CO_2)		4.2	25% (C_2H_4)	300	1200		12 h @ 1200 mA cm^{-2}	
		Slim flow cell (1, 5 sccm CO_2)			48% (C_{2+})	288				
		Slim flow cell (1, 3 sccm			50% (C_{2+})	600				

		CO_2)								
Cu GPE		homemade electrolytic cell	0.5 M $KHCO_3$	−1.94	62.8% (C_{2+})	2300	3500		168 h @ 200 mA cm^{-2}	[274]
			Catholyte: 3.5 M KCl Anolyte: 3.5 M KOH	−0.95	65% (C_{2+})	2000				
cavity Cu	0.8	Flow cell (1)	1 M KOH	−0.59	75.6 ± 1.8% (C_{2+})	605 ± 14			12 h @ 200 mA cm^{-2}	[275]
CuTA	1.2	Flow cell (1)	1 M KOH		86.1 ± 3.1% (C_{2+} with 60.8 ± 2.3% C_2H_4, 18.6 ± 2.0% C_2H_5OH)	602.7 (C_{2+} with 425.6 C_2H_4)	1000		15 h @ 500 mA cm^{-2}	[276]
CO_2RR synthesized faceting		MEA (5)	0.15 M $KHCO_3$	−0.7	90% (C_{2+})	520	780	37	65 h @ 350 mA cm^{-2}	[277]
		Flow cell (1)	7 M KOH	−0.63		280	300		20 h @ 350 mA cm^{-2}	
CoPc@HC/Cu	CoPc @HC: 0.5	Flow cell	0.5 M H_3PO_4 + 0.5 M KH_2PO_4 +		82% (C_{2+} with 61% C_2H_4)	656 (C_{2+} with 488 C_2H_4)	900		12 h @ 350 mA	[278]

	Cu: 1		2.5 M KCl	76 ± 2% (C_{2+} with 55 ± 3% C_2H_4)	608 (C_{2+} with 440 C_2H_4)		cm^{-2}	
Cu_9Ga_4	1	Flow cell	1 M KOH	71% at 1700 mA cm^{-2} (C_{2+}) 52.4% at 2400 mA cm^{-2} (C_{2+})	1207 1258	2600		[279]
		MEA (5)		−4 ± 0.4	~55% (C_{2+})		1500 (total)	> 55 h @ 300 mA cm^{-2}
		MEA (25)		~4			50000 (total)	3 h @ 2000 mA cm^{-2}
De-alloyed CuAl		Flow cell	1 M KOH		~86% (C_{2+})	516	600	50 h @ 400 mA cm^{-2} 5 h @ 600 mA cm^{-2}	[280]
			3 M KOH		48~52% (C_2H_4)			50 h @ 150 mA cm^{-2}

			3 M KOH + 3 M KI		73 ± 4% (C_2H_4)					
CoCu SAA	0.5	Flow cell (2)	1 M $KHCO_3$	−1.07	34.4% (C_2H_4)	282	700	22.5 (half)	3 h @ 300 mA cm^{-2}	[281]
I-Cu HPF		Self-made quartz cell	3 M KI	−1.27	63.8% (C_{2+})		3000		120 h @ 2000 mA cm^{-2}	[282]
POD-Cu		Flow cell	1 M KCl	−2.34 V vs NHE	80.3% (C_{2+} with 38.3% C_2H_4, 30.1% ethanol, 10.1% acetate)	511 mA cm^{-2} @ −2.45 V			4 h @ 300 mA cm^{-2}	[283]
Nano Cu with I_2	0.8	Flow cell (1)	0.3 M KI in 0.05 M H_2SO_4		> 70% (C_{2+})		600		8 h @ 500 mA cm^{-2}	[284]
Sm-CuO_x		Flow cell	1 M KOH		80% (C_{2+})	1000	1250			[285]
Eu-CuO_x					75% (C_{2+})	937.5	1250			
Gd-CuO_x					74% (C_{2+})	925	1250			
6.5% Gd_1/CuO_x	1	Flow cell	2 M KOH	−0.8	81.4% (C_{2+})	444.3			40 h @ 500 mA cm^{-2}	[286]
CuO/3DOM SiO_2		Flow cell	1 M KOH		11.8% (n-propanol)	35.4	500		120 h @ 100	[287]

	mA cm^{-2}

Table S2. Summary of catalysts performances for CORR at ampere-level current.

Catalysts	Catalyst loading (mg cm^{-2})	Electrolysis window (cm^2)	Electrolyte	Potential (V vs RHE) / Cell voltage (V)	$FE_{main\ product}$	$j_{main\ product}$ (mA cm^{-2})	Maximum operation current (mA cm^{-2})	Energy efficiency (%)	Stability (h)	Ref.
Cu NC	0.5	Flow cell (1)	0.5 M $KHCO_3$		43% (acetate)	194.4		11.1	150 h @ 100 mA cm^{-2}	288
		solid electrolyte reactor system (4)	porous solid Dowex 1 × 4 copolymer		30% (acetate)	250	700		10 h @ 700 mA cm^{-2}	
$N_2SN/CuAu_{1\%}$	1	Flow cell (1)	1 M KOH		79% (C_{2+}) 58% (acetate)	423 (C_{2+}) 308 (acetate)	700			289
	1	MEA (1)	1 M KOH		89% (C_{2+}) 55% (acetate)	397 (C_{2+}) 219 (acetate)	1000	24%	500 min @ 100 mA cm^{-2} 400 min @ 200 mA cm^{-2} 200 min @ 300 mA cm^{-2}	
Cu		MEA	1 M KOH		> 80% (C_{2+})	506	600		120 h @ 200 mA cm^{-2}	290
Cu GDE	0.8	double walled electrolysis cell	Catholyte: 1 M KOH) Anolyte: 1 M H_3PO_4		87% (C_{2+}) 35% (C_2H_4)		4000		5 h @ 1000 mA cm^{-2} 10 h @ 500 mA cm^{-2} 50 h @ 200 mA cm^{-2}	291

CuPc	2.0±0.1	MEA	0.1 M KOH		84.2% (C_{2+})	605	1400	33.5 (C_{2+}) 27.3 (acetate)	100 h @ 300 mA cm^{-2}	[292]
20Cu-Ti_4O_7		Flow cell	1 M KOH	−0.8	96.4% (C_{2+})	432.6	470.3 @ −0.8 V	45.1	1000 min	[293]
Ag-doped Cu_2O	0.8	PSE cell (2.25)	porous styrene–divinylbenzene sulfonated copolymer		55 ± 2% (acetate)	> 371	1000		150 h @ 400 mA cm^{-2}	[294]
Ni-doped Cu NWs	0.5	Flow cell	1 M KOH	−0.77	56% (ethanol)	200	600		40 h @ 300 mA cm^{-2}	[295]
		MEA	1 M KOH	2.7	54% (ethanol)			21	300 h @ 300 mA cm^{-2}	
$CuPd_{0.6}$	0.5	Flow cell	2 M KOH		59.5% (acetate)	286 mA cm^{-2} @ −0.86 V	700		16 h @ 100 mA cm^{-2}	[296]
		Flow cell	2 M KOH						200 h @ 100 mA cm^{-2} (hydrophobized GDE)	
		MEA	2 M KOH					26.6	500 h @ 100 mA cm^{-2}	
CuPd	0.5	Flow cell	1 M KOH	−1	70 ± 5% (acetate)	425				[297]
		MEA (5)		−3.4 ± 0.2	~50% (acetate)	250	500	27.6	500 h @ 500 mA cm^{-2}	
CuO nanosheets	1.75	MEA (4)	0.1 M KOH		44.6% (acetate)	1226.5	1800			[223]

		0.6 MPa pure CO (30 sccm CO)	1 M KOH		92.4% (C_{2+})	2080	3000		40 h @ 1000 mA cm^{-2}	
		0.6 MPa pure CO (60 sccm CO)			90% @ 40 A (C_{2+})		3500	40		
		Electrolyser stack (100)			> 65% @ 250 A (C_{2+})		3100			
Cu(25 nm)-CN-3	~0.3	Solid electrolyte electrolyser (1)	porous solid electrolyte	−4.45	56.6% (acetate)		500	26.6	120 h @ 100 mA cm^{-2}	298
		Flow cell	1 M KOH	−0.87	62.8% (acetate)	188				
GD-Cu		Flow cell	3 M KOH		56 ± 2% (acetate)	222 ± 7	500		40 h @ 400 mA cm^{-2}	299
$C_{18}S$–CuNPs	0.8	Flow cell	1 M KOH		70% (acetate)	280	600		35 h @ 100 mA cm^{-2} in MEA	300
$CuAu_{1\%}$	0.5	Flow cell (1)	1 M KOH		39% (acetate)	217	700		130 min @ 200 mA cm^{-2}	301
Cl-aCu HPE		Home-made gas-tight two-compartment quartz electrolyzer	Catholyte: 3 M KCl Anolyte: 1 M KOH	−0.95	90.5% (C_{2+})	1800	2000	32.3	200 h in 3 M KCl @ 2000 mA cm^{-2}	39
Cu_3Ag_7	1	Flow cell (1)	1 M KOH		60% (C_{2+})		600		25	302
OD-Cu		Flow cell	1 M KOH		91% (C_{2+})	630	1000		1 h @ 500 mA cm^{-2}	303
Cu/30Ag	1	Flow cell (1)	1 M KOH		60.77 ±	486.16 ±	800			304

					1.52% (Oxygenates)	12.16				
					66.81% (Oxygenates)	801.72	1400			
		MEA							28 h @ 500 mA cm^{-2}	
Cu nanoparticles		MEA (4)	0.5 M KOH	2.78 ± 0.01	87 ± 1% (C_{2+})	435	5000		150 h @ 1000 mA cm^{-2}	305
		Five MEA (Five 100 cm^2)	0.5 M KOH		96% (C_{2+})		4000		32 h @ 100000 mA	
Cu(100)-rich Cu	1	MEA	1 M KOH	−2.3	93% (C_{2+})	465	700	41	150 h @ 500 mA cm^{-2}	232
$Cu(OD)_{0.8}Ag_{0.2}$	0.8	MEA (1)	1 M KOH		83% (C_{2+})		15000		103 h @ −2.98 ± 0.09 V	306
CuO-XA-9	0.4	MEA	1 M KOH		78% (C_{2+})	780				307
CuO-Nafion				2.4	90% (C_{2+})	900	1000		110 h @ 200 mA cm^{-2}	
Ag-Ru-Cu		MEA (5)	1 M KOH	3.15	93% (C_{2+})	540	600		100 h @ 300 mA cm^{-2}	308
					37 ± 3% (*n*-propanol)	153 ± 12				
	Cu: 6	MEA (15)		−2.60 ± 0.02	93% (C_{2+} with 36 ± 3% *n*-propanol)	279 (C_{2+} with 108 *n*-propanol)		37	150 h @ 4.5 A	

OD-Cu-Cs	2	Flow cell	1 M KOH	−0.66 V @ 2000 mA cm^{-2}	96% (C_{2+})	2804 (C_{2+}) 1205 (alcohol)	3000		10 h @ 2000 mA cm^{-2}	309
Cu/5Zn	1	Flow cell	1 M KOH		50.7% (C_{2+} alcohol) 49 37	557.7 441 928	2500		30 h @ 300 mA cm^{-2}	310
CuO-S20		Flow cell	1 M KOH		94.7% (C_{2+}) 47.1% (alcohol) @ 2000 mA cm^{-2} 98.3% (C_{2+}) 42.5% (ethanol) 55.1% (n-propanol) @ 700 mA cm^{-2}	698 (ethanol) 942 (alcohol)	2000		30 h @ 700 mA cm^{-2}	311
		MEA	1 M KOH		45.8% (ethanol) 56.6% (alcohol)		2000	42 (C_{2+}) 25 (alcohol)	100 h @ 500 mA cm^{-2}	
Pb-rich Cu		Flow cell	1 M KOH		47 ± 3% (*n*-propanol)			25 (half)	10	312
		MEA (5)			> 30% (*n*-	378	1000	18	100 h @ 300	

					propanol)	(total)	(total)		mA cm^{-2}	
Cu-HDD		MEA	1 M KOH	−0.71~0.77	> 90% (C_{2+})		1000		300 h @ 500 mA cm^{-2}	[313]
			solid-state electrolyte	3.94	~90% (C_{2+})				20 h @ 1000 mA cm^{-2}	
Cu-s		MEA (1)	1 M KOH	2~2.6	> 80% (C_{2+})		1000		180 h @ 100 mA cm^{-2}	[314]
Oxide-derived Cu	1	MEA (1)	1 M KOH	−0.72	> 91% (C_{2+})	830	1000	11.5 (acetate)	1 h in 2 M KOH @ 500 mA cm^{-2}	[303]
OD-Cu/MgAlNS	CuO: 2.91 MgAlNS : 0.29	Flow cell	1 M KOH	−0.7	71% (C_{2+})	1251				[315]
CuSn	3.6	MEA	3 M KOH		47 ± 3% (n-propanol)		800	24		[316]
		MEA (16)							120 h @ 150 mA cm^{-2}	
R-Cu/Au		Flow cell	1 M KOH	−0.78	~46.6% (n-propanol)	~ 124	508		8 h @ −0.58 V	[317]
Cu cube-1		Flow cell	1 M KOH		~70% (C_{2+})		1000			[318]
Cu needle-2		Flow cell	0.1 M KOH		>80% (C_{2+})	400	1000			
		MEA	0.1 M KOH 0.3 M KOH 0.5 M KOH 1 M KOH 2 M KOH		13.2% 36.8% 81.8% 85.3% 87.8%	66 184 409 426.5 439	1000			
		MEA (anode: NiFe on Ni foam)	2 M KOH	~2.4 V @ 1000 mA cm^{-2}	90% 75.4%	902 1885	2500		20 h @ 1000 mA cm^{-2}	

				2.7 V @ 1000 mA cm^{-2}						
Cu_5Ga_1		Flow cell	1 M KOH		85% (C_{2+})		1300		120 h @ 300 mA cm^{-2}	[250]
		MEA (1)	2 M KOH	3	90% (C_{2+})		2500	30% (full)		
Ag-doped Cu	1	Flow cell	1 M KOH	−0.56	80% (C_{2+})	308 ± 6				[319]
				−0.46	33 ± 1% (n-propanol)	36 ± 2		21		
Cu	1	Flow cell	1 M KOH	−0.72	65% (C_2H_4)	808	1500	35～44		[320]
			5 M KOH	−0.6	58% (C_2H_4)	728	1500			
TBA^+-coated Cu	1.25	Flow cell	1 M KOH	−0.65	78% (C_{2+} with 40% C_2H_4)	765				[321]
	0.75			−0.75	76% (C_{2+}) 48% (C_2H_4)	1097 (C_{2+}) 694 (C_2H_4)				
	1.5				76% (C_{2+}) 48% (C_2H_4)	1097 (C_{2+}) 694 (C_2H_4)			10 h @ 1200 mA cm^{-2}	
Cu_3N-HDD		Flow cell	1 M KOH		92.9% (C_{2+}) @ 1000 mA cm^{-2}		1200			[18]
		Cell 2 in the tandem MEA	1 M KOH		93.5% (C_{2+})		800			

		cells								
Cu	1	Flow cell (4)	1 M KOH	−0.69	55.5±2.2% (C_2H_4)	495				[322]
TCNQ-modified Cu		Flow cell	1 M LiOH		75% (C_2H_4)	375	600			[323]
		MEA	1 M LiOH		> 70% (C_2H_4)	442		32	> 100 h @ 500 mA cm^{-2}	
CuCube HFGDE		custom-built flow cell	1 M KOH		88% (C_{2+}) 64% (C_2H_4)	418			36 h @ −0.8 V vs RHE	[324]
			2 M KOH		68% (C_2H_4)	551				
			5 M KOH		92% (C_{2+}) 66% (C_2H_4)	732				
Cu GDE	0.9 ± 0.1	Flow cell (1)	1 M KOH	−0.75	> 80% (C_{2+}) 46% (C_2H_4)	1280 (C_{2+})			8 h @ 200 mA cm^{-2}	[325]

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