Supplementary Information for

The design of alternative anodic reactions paired with electrochemical CO_2 reduction

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Supplementary Table 1 Alternative anode reactions paired with CO_2RR.

$E_{electrode}$ (V)	J (mA cm $^{-2}$)	Cathode catalyst	Cathode product(s), FE (%)	Anode reaction	Anode catalyst	Anode product(s), FE/DE (%)	Cell type	Ref
E_{cat} -0.59, E_{an} 0.73V vs. RHE, E_{cell} 1.4V	67.79 (total)	GDL-deposited Ag	CO (96.25)	Glycerol	Pt	$HCOO^{-}$, $C_3H_6O_3$	Flow cell	1
E_{cat} -0.3, E_{an} 1.5V vs. RHE, E_{cell} 2.0V	~7 (total)	Fe-SAs/N-C	CO (99.6)	hypochlorite	RuO_2/Ti	82	H-cell	2
E_{cat} -1.7V vs. SHE, E_{cell} 2.5V	100 (total)	Ag	CO (90)	urea oxidation	Ni foam	-	H-cell	3
E_{degra} -1.7V vs. Ag/AgCl	43 (cathode)	CNT40/ESGDE cathode	Formate (72.38)	MO	Ti/SnO_2-Sb anode	100	H-cell	4
E_{degra} -1.7V vs. Ag/AgCl	38 (cathode)	EBGDE-60	Formate (91.46)	MO	Ti/SnO_2-Sb	100	H-cell	5

E_{cell} 2.8V	9 (total)	Sn	HCOOH (14.1)	crystal violet (CV)	Co_3O_4	52.6	two-electrode glass cell	[6]
E_{degra} 1.8V vs. Ag/AgCl	18 (anode)	Cu/Bi	Formate (84.63)	p-nitrophenol	Ti/SnO_2-Sb	97.31	H-cell	[7]
E_{degra} -0.8V vs. Ag/AgCl	-0.9 (cathode)	flower-like CuO	CH_3OH, C_2H_5OH (electron efficiency 73.1)	4-nitrophenol	Co_3O_4 arrays	99.2	H-cell	[8]
E_{degra} -1.3V vs. Ag/AgCl	-3 (cathode)	SnO_2/CC	HCOOH (24.1)	4-nitrophenol	3D gear shaped Co_3O_4	99.1	H-cell	[9]
-	24 (total)	Sn	formic acid (45mM)	Acid Orange 7	boron-doped diamond	TOC (>80)	H-cell	[10]
E_{cat} -0.7V vs. RHE	-3.7 (cathode)	copper–indium cathode	CO >70	Alcohol to acetaldehyde and acetic acid	platinum anode	>75	H-cell	[11]
E_{cell} 2.53-2.63V	-15 (cathode)	gold plate	CO (76)	1,2-propanediol to lactic acid	carbon felt	80	Flow cell	[12]
E_{cat} -1.1V vs. Ag/AgCl E_{cell} 2 V	0.09 (total, E_{cell} 2 V)	[(tpy)(Mebim-py)Ru^{II}(OH_2)]$^{2+}$	CO&H_2 (30-40)	Ph–CH_2OH oxidation	[Ru(bis-Mebimpy)(4,4′-($(OH)_2OPCH_2)_2$-	Benzaldehyde (70)	H-cell	[13]

E_{cat} -1.8, E_{an} 2.43 V vs. Ag/AgCl, E_{cell} 4 V	2.4 (total)	Re(bipy-tBu)$(CO)_3$Cl	CO (100)	Syringaldehyde to benzimidazole	bpy)$(OH_2)]^{2+}$ ceric ammonium nitrate (CAN)+syringaldehyde+o-phenylenediamine	65	H-cell	14
E_{cell} 2.5 V	2 (total)	BiO_x	Formate (81)	HMFOR	NiO NPs	36 for biomass conversion	H-cell	15
E_{cell} 2.7 V	103.5 (total)	PdO_x/ZIF-8	CO (97)	HMFOR	PdO	84.3 for HMFOR (20.0 maleic acid, 64.3% of formic acid)	H-cell	16
E_{cell} 3.8 V	100	TPPNi-CB/GDE	CO (~98.5)	CER	DSA	Cl_2 (~80)	Flow cell	17
E_{cat} -2.241, E_{an} 1.36 V vs. SHE	15.7 (cathode), 2.53 (anode)	graphite rod	CO (92.23)	CER	Au foil	Cl_2 (82.5)	H-cell	18
E_{cat} −1.01 V vs RHE	-19 (cathode)	Cu foil	C_2H_5OH (12)	Br^- to Br_2 combined $*CHCH_2$ to form $BrCH_2CH_2OH$	Pt	2-bromoethanol (40)	membraneless cell	19
E_{cell} -3.75 V	12 (cathode)	Au	CO (48), H_2 (33), MeOH to MeO^-	Br^- to Br_2, to form	glassy carbon	dimethyl carbonate (60)	membraneless cell	20

				dimethyl carbonate				
-	10 (total)	Ni	-COOH	Au	N-bromoamino acids synthesis	N-bromoamino acid (68)	undivided cell	21
-	20 (total)	Pt plate	-COOH&-CHO	Pt wire	carboxylation of benzyl halides	N-methyl-N-(phenylacetoxy)methylformamide (69)	one-compartment cell	22
E_{cell} 3.22 V	15 (total)	Pt plate	-COOH	Pt net	tetraalkylammonium salt anion oxidation	Cyanoacetic Acid (24.7)	H-cell	23

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