Supporting information

A comprehensive analysis of key factors influencing methane production from CO_2 via microbial methanogenesis cells

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Table S1. Microbial methanogenesis cell data from previous published studies used in our analysis.

Influencing parameters						Outputs			References
Inoculum	**Anode**	**Cathode**	**Cat pot (V vs. Ag/AgCl)**	**Membrane**	**S/V ratio (m^2/m^3)**	**MPR (L/m^2-d)**	**Methane recovery (%)**	**Current density (A/m^2)**	
Mixed	Ti/IrO_2	Ti mesh/Pt	-2.5	AEM	8.0	205.4	65	25.4	[1]
Mixed	Ti/IrO_2	Ti mesh/Pt	-1.84	AEM	8.0	202.2	85	68.1	[2]
Mixed	Ti/IrO_2	Ti mesh/Pt	-2.1	AEM	8.0	196.5	95	14	[1]
Mixed	Ti/IrO_2–Ta_2O_5	GGAC	-1.05	CEM	25.0	183.8	27	21.4	[3]
Mixed	Ti/IrO_2	Ti mesh/Pt	-1.6	AEM	8.0	170.6	62	6.1	[1]
Mixed	Pt/Ti/IrO_2	GAC	-0.58	CEM	66.7	65.0	66	35	[4]
Mixed	Pt/Ti/IrO_2	GAC granules	-0.58	CEM	66.7	65.0	66	-	[4]
Mixed	Pt/Ti/IrO_2	graphite granules	-1.1	CEM	66.7	62.0	67	-	[4]
Mixed	Ti/IrO_2–Ta_2O_5	GGAC	-1	CEM	25.0	39.3	22	2.97	[3]
Defined	Pt/Ti	NiMo on graphite	-	CEM	50.0	28.0	98	10	[5]
Mixed	Ti/IrO_2	Carbon felt	-	CEM	38.5	26	-	8	[6]
Mixed	Ti/IrO_2	Carbon felt	-	CEM	38.5	23.6	-	4.8	[6]
Mixed	Carbon brush	carbon cloth	-1.2	AEM	5.6	15	-	-	[7]
Mixed	Ti/IrO_2–Ta_2O_5	Ni foam	-0.95	CEM	25.0	10.8	93	1.1	[8]
Mixed	Pt/Ti	GF	-0.9	CEM	89.3	10.7	-	-	[9]
Mixed	Pt foil	GF	-1.3	CEM	40.0	8.8	69	7.1	[10]
Mixed	carbon felt	carbon felt	-0.75	CEM	20.4	7.5	89	3.4	[11]
Mixed	Pt foil	HSSF	-1.3	CEM	40.0	7.2	-	-	[10]
Mixed	Pt/Ti	GF	-0.9	CEM	89.3	5.2	73	2.9	[9]
Mixed	Pt foil	SSF	-1.3	CEM	40.0	3.7	-	-	[10]

Mixed	graphite felt	graphite felt	-0.9	CEM	58.2	5.1	99	1.6	[12]
Mixed	graphite stick	graphite stick	-0.9	CEM	7.7	4.6	-	9.9	[13]
Mixed	carbon brush	carbon cloth	-1	AEM	5.6	4	96	1.8	[7]
Mixed	Ti/IrO_2–Ta_2O_5	Ni foam	-1	CEM	25.0	4.0	-	2.1	[8]
Mixed	Ti/IrO_2–Ta_2O_5	Ni foam	-0.9	CEM	25.0	3.2	-	0.9	[8]
Mixed	graphite felt	graphite felt	-0.8	CEM	58.2	3	92	0.9	[12]
Mixed	glassy carbon rod	carbon paper	-0.95	CEM	3.3	2.1	76	1	[14]
Mixed	carbon brush	Pt/GB	-0.6	CEM	4.0	1.4	78	-	[15]
Mixed	carbon fiber brush	carbon cloth	-1	CEM	28.6	0.8	36	0.41	[16]
Defined	carbon brush	carbon cloth	-1	AEM	5.6	0.3	-	-	[7]
Mixed	CC	CC	-0.7	CEM	20.0	0.2	93	0.2	[17]
Defined	graphite rod	graphite rod	-0.9	CEM	1.1	0.197	59	0.2	[18]
Defined	graphite rod	graphite rod	-0.9	CEM	1.1	0.196	55	0.2	[18]
Defined	graphite rod	graphite rod	-0.9	CEM	1.1	0.177	45	0.3	[18]
Defined	graphite rod	graphite rod	-0.9	CEM	1.1	0.168	57	0.2	[18]
Defined	graphite rod	graphite rod	-0.9	CEM	1.1	0.092	51	0.1	[18]
Mixed	Pt/Ti	graphite felt	-0.75	CEM	89.3	0.1	18	0.3	[19]

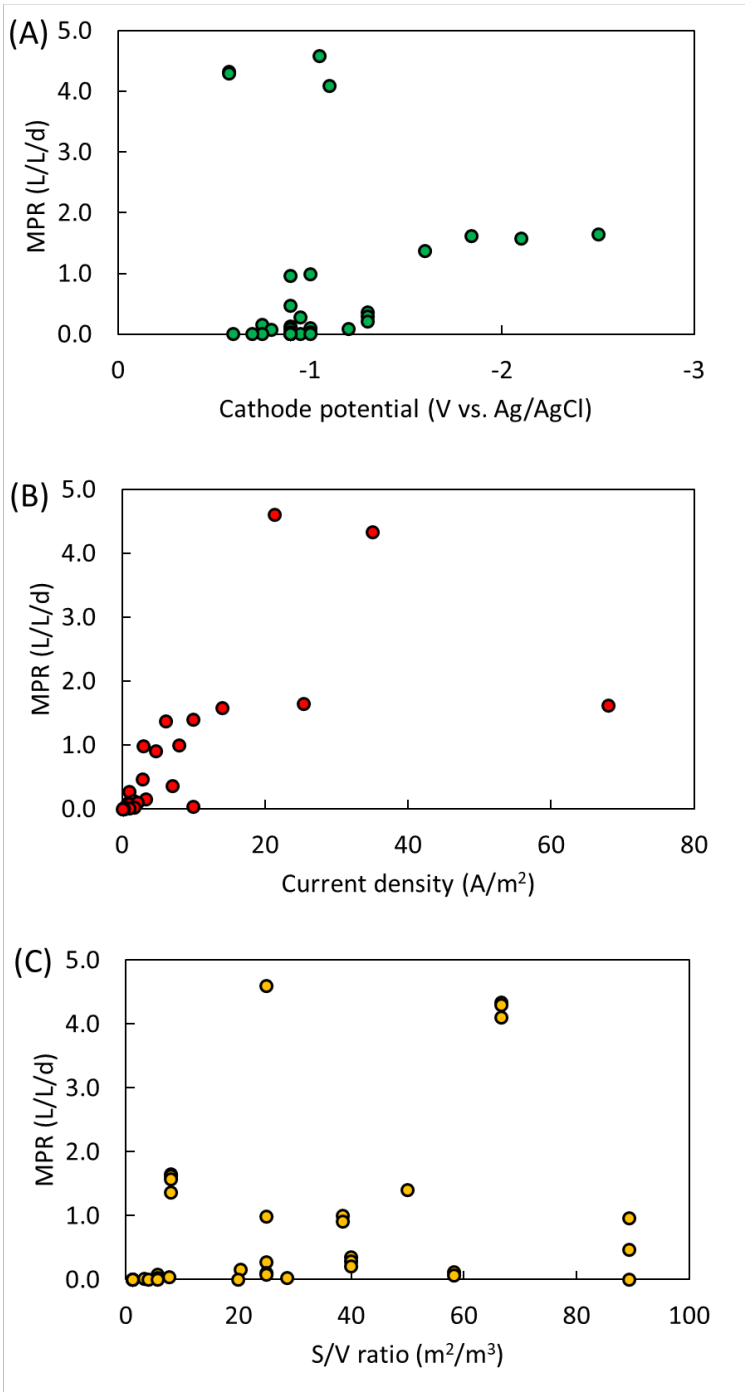

Fig. S1. Correlation between methane production rates normalized with liquid catholyte volume (L) and (A) cathode potential, (B) current density, and (C) cathode surface area-to-volume ratio in microbial methanogenesis cells.

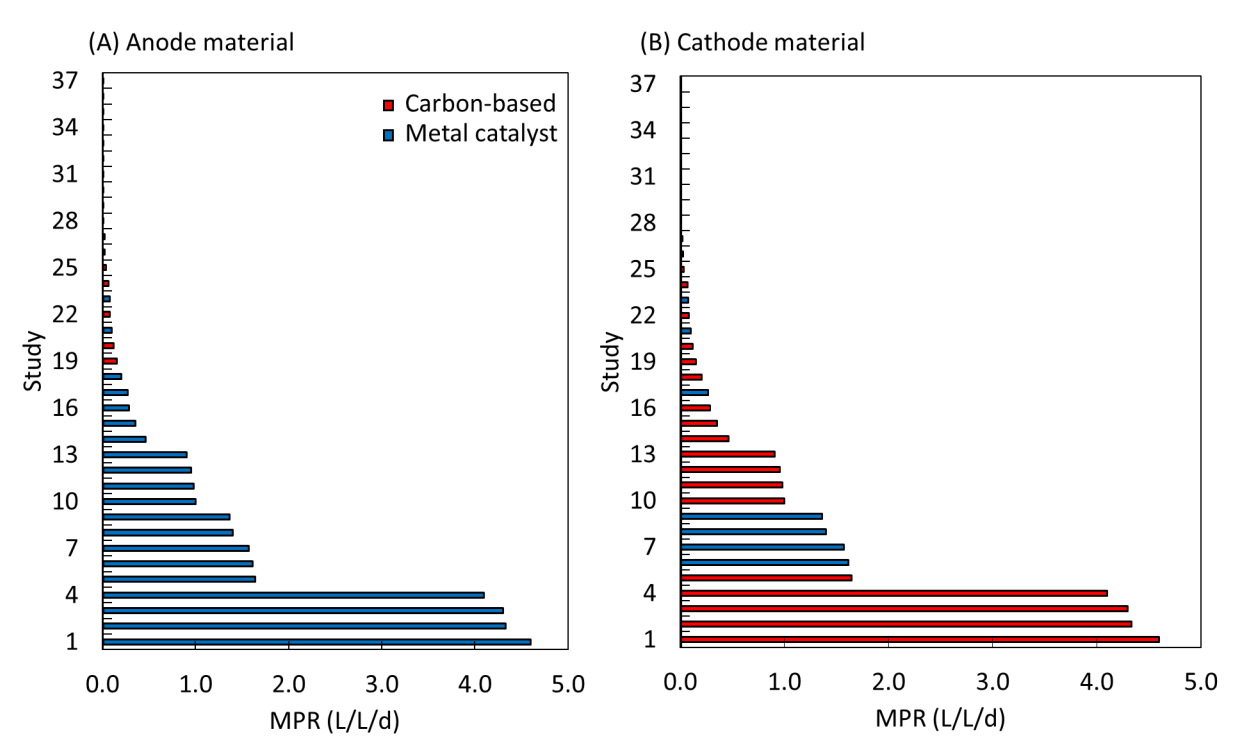

Fig. S2. Methane production rates normalized with liquid catholyte volume (L) and the (A) anode and (B) cathode materials applied. Box plots shows the distribution of methane production rates obtained from each data point that used carbon-based material (red) and metal catalyst (blue).

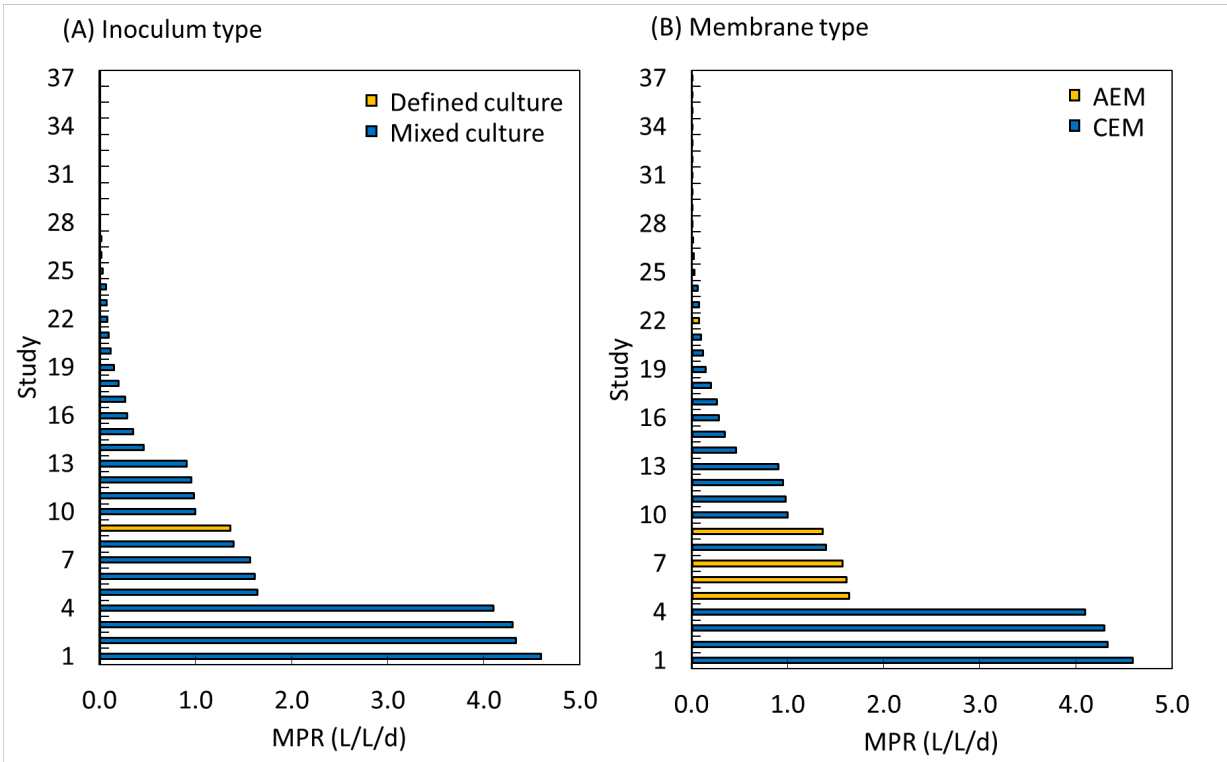

Fig. S3. Methane production rates normalized with liquid catholyte volume (L) with the (A) inoculum type and (B) membrane type applied. Box plots shows the distribution of methane production rates obtained from each data point.

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