

Supplemental Information

An Integrated Microbial Electrolysis-Anaerobic Digestion Process Combined with Pretreatment of Wastewater Solids to Improve Hydrogen Production

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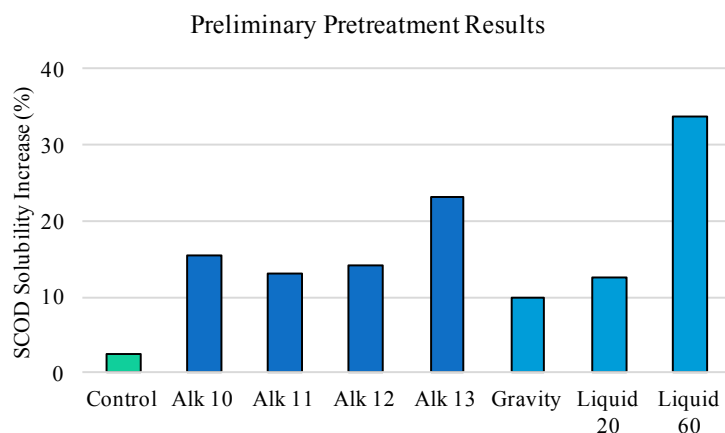


Figure S1. Effects of Alkaline and Thermal Hydrolysis Pretreatment on soluble COD in (Top) small-scale preliminary tests

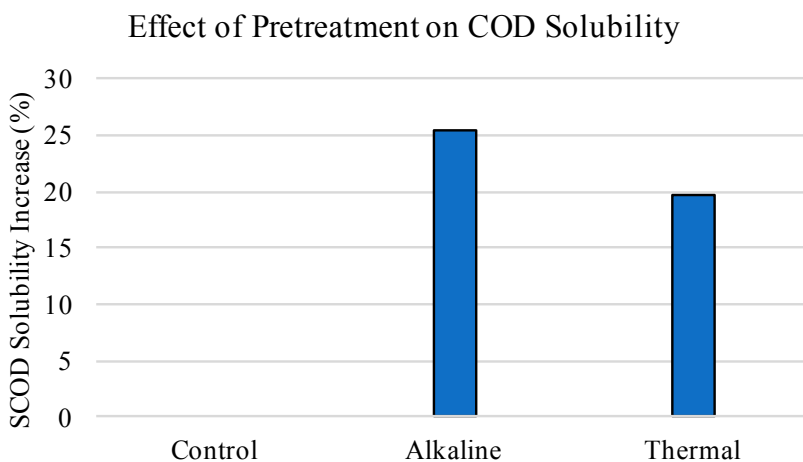


Figure S2. Effects of Alkaline and Thermal Hydrolysis Pretreatment on increasing soluble COD in laboratory 1-L tests versus control

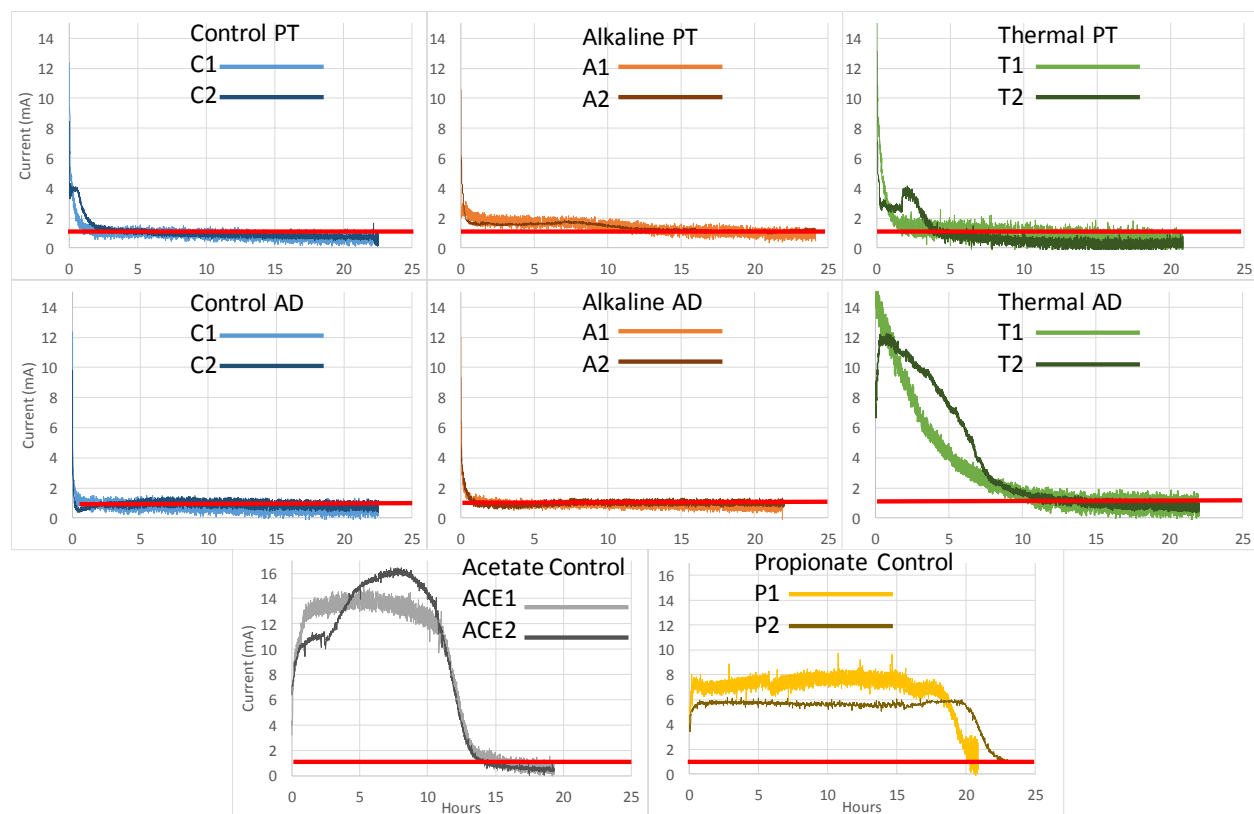


Figure S3. Electrochemical Data from MEC Experiments. Top Row: Pretreatment Soluble Phase (Control, Alkaline, and Thermal), Middle Row: Anaerobic Digester Effluent (Control, Alkaline, and Thermal). Bottom Row: Acetate and Propionate Controls

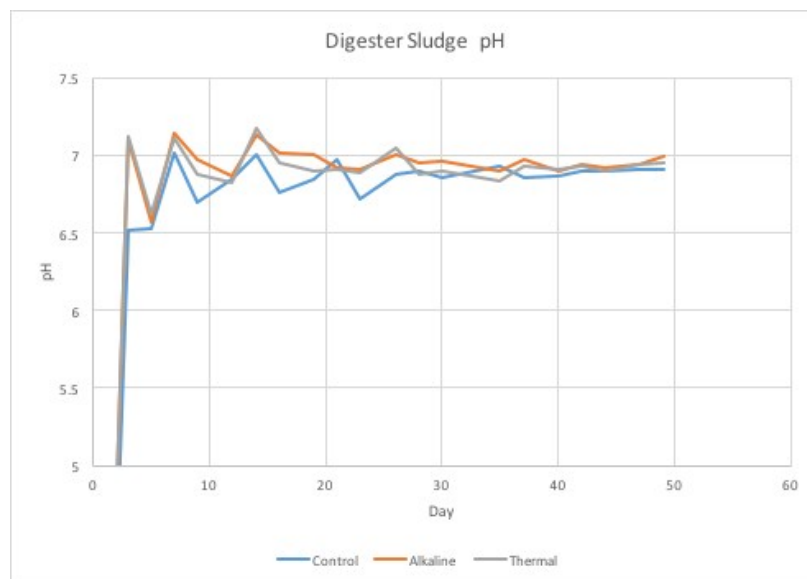


Figure S4. Digester Sludge pH for Control, Alkaline, and Thermal Reactors.

Table S1. ADMEC Experiment Data for COD Balance

COD ₀ (g)			PT		AD				MEC AD			MEC PT			Total
			SCOD	PCOD	SCOD	PCOD	Electrons	Methane	SCOD	Electrons	Biomass	SCOD	Electrons	Biomass	Electrons
Control	C1	1.00	0.130	0.870	0.217	0.211	0.377	0.199	0.150	0.050	0.011	-0.005	0.128	0.007	0.377
	C2	1.00	0.130	0.870	0.168	0.260	0.337	0.199	0.050	0.110	0.008	0.102	0.028	0.007	0.337
Alkaline	A1	1.00	0.320	0.680	0.240	0.211	0.087	0.039	0.220	0.010	0.012	0.265	0.039	0.016	0.087
	A2	1.00	0.320	0.680	0.238	0.213	0.211	0.039	0.150	0.080	0.012	0.228	0.092	0.016	0.211
Thermal	T1	1.00	0.270	0.730	0.215	0.242	0.234	0.069	0.050	0.150	0.011	0.241	0.015	0.014	0.234
	T2	1.00	0.270	0.730	0.173	0.284	0.159	0.069	0.080	0.080	0.009	0.260	0.010	0.014	0.159

Table S2. COD Balance Summary

COD ₀ (g)		PT		AD				MEC AD			MEC PT			Total
		SCOD	PCOD	SCOD	PCOD	Biomass	Methane	SCOD	Electrons	Biomass	SCOD	Electrons	Biomass	Electrons
Control	1.00	0.130	0.870	0.19	0.24	0.240	0.200	0.10	0.08	0.01	0.05	0.08	0.007	0.357
		± 0.00	± 0.00	± 0.02	± 0.02	± 0.00	± 0.00	± 0.05	± 0.03	± 0.002	± 0.05	± 0.05	± 0.00	± 0.02
Alkaline	1.00	0.320	0.680	0.24	0.21	0.190	0.040	0.19	0.04	0.012	0.24	0.07	0.016	0.149
		± 0.00	± 0.00	± 0.00	± 0.00	± 0.00	± 0.00	± 0.03	± 0.03	± 0.00	± 0.03	± 0.03	± 0.00	± 0.06
Thermal	1.00	0.270	0.730	0.19	0.26	0.200	0.070	0.07	0.12	0.010	0.24	0.01	0.014	0.196
		± 0.00	± 0.00	± 0.02	± 0.02	± 0.00	± 0.00	± 0.02	± 0.04	± 0.001	± 0.00	± 0.00	± 0.00	± 0.04

Table S3. Energy Production Summary

Substrate	Anaerobic Digestion			MEC PT			MEC AD			Total Energy		
	Energy (J/gCOD*d)	SCOD Fed	Total Energy	Energy (J/gCOD*d)	SCOD Fed	Total Energy	Energy (J/gCOD*d)	SCOD Fed	Total Energy	Energy	Average Energy	ST Dev
C1	2,755.20	0.87	2,397.02	638.17	0.13	82.96	835.68	0.22	181.24	2,661.23	2,699.93	38.70
C2	2,755.20	0.87	2,397.02	421.38	0.13	54.78	1,709.72	0.17	286.83	2,738.63		
A1	688.80	0.68	468.38	699.96	0.32	223.99	724.07	0.24	173.76	866.13	1,028.31	162.18
A2	688.80	0.68	468.38	841.90	0.32	269.41	1,904.04	0.24	452.69	1,190.48		
T1	1,136.52	0.73	829.66	623.85	0.27	168.44	7,006.99	0.21	1,504.51	2,502.61	2,466.52	36.09
T2	1,136.52	0.73	829.66	966.30	0.27	260.90	7,762.12	0.17	1,339.87	2,430.44		