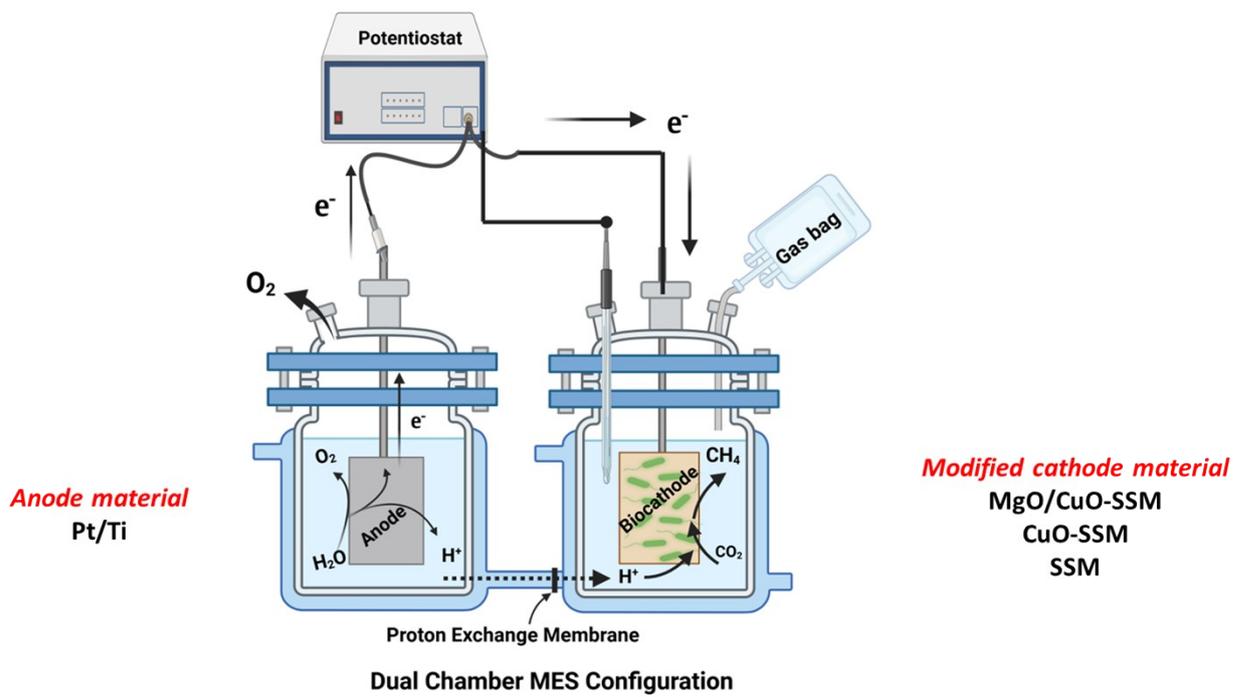
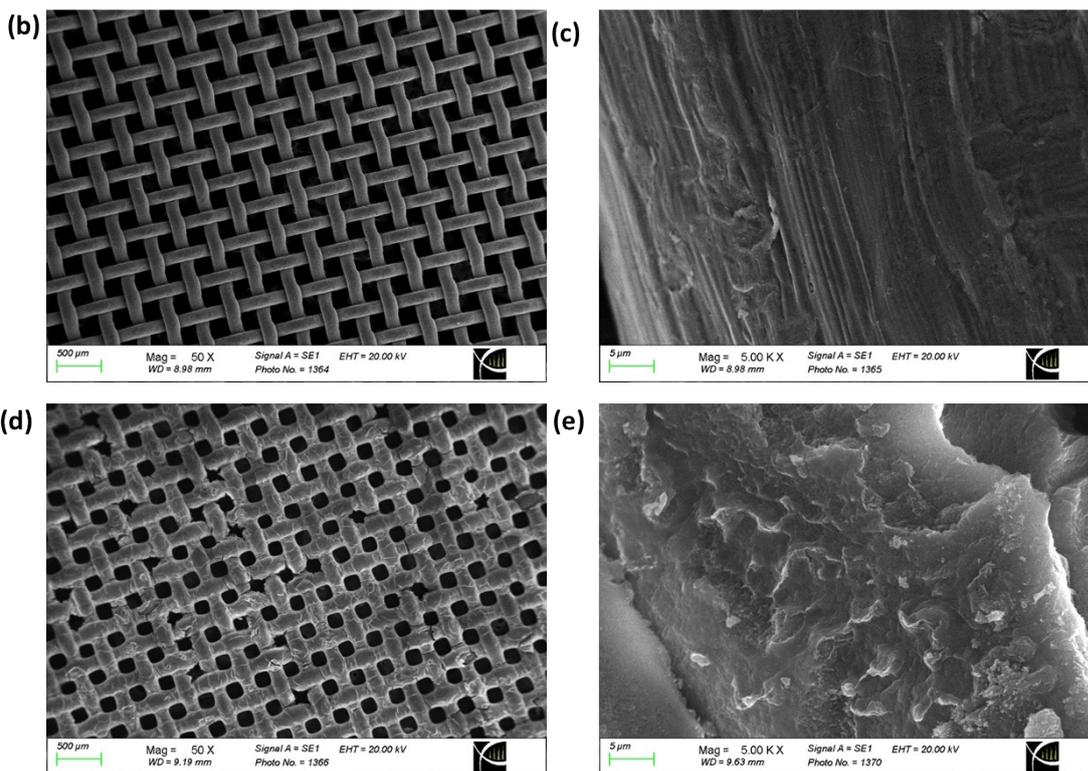
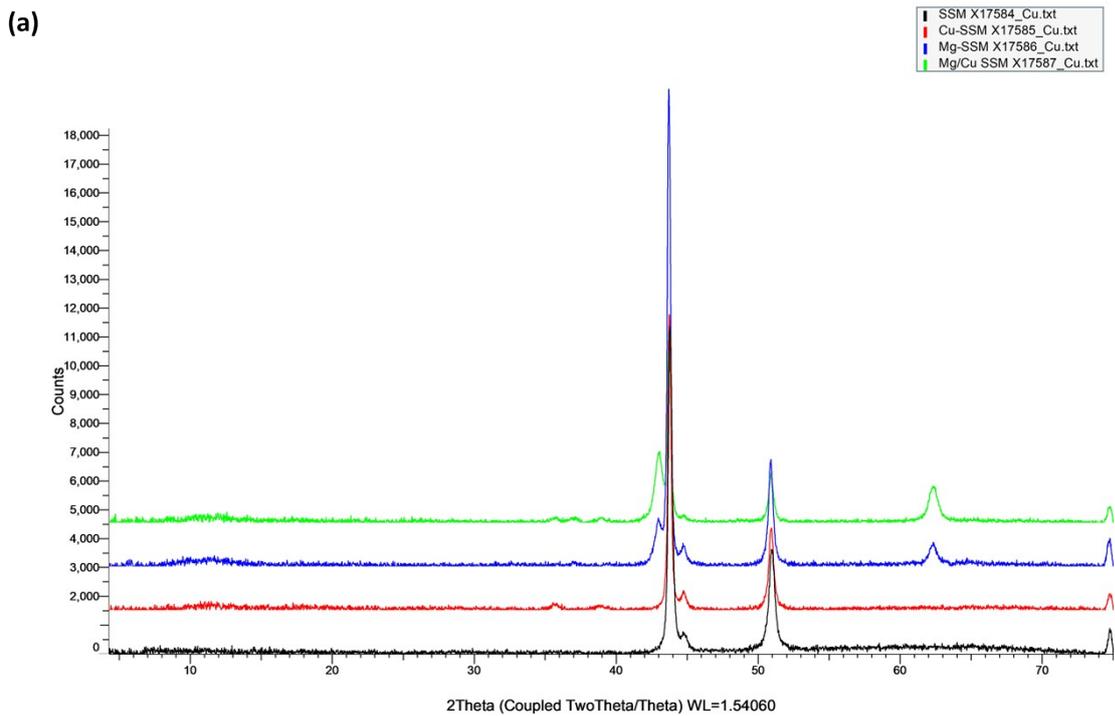


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Fig. S1 Schematic representation of a dual-chamber MES reactor configuration with an abiotic anode and a biotic cathode electrode, separated by Nafion™ 117 (PEM).



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47 **Fig. S2** XRD pattern for all cathodes (a) and SEM images at different magnifications. (b-c) SSM, and
 48 (d-e) MgO-SSM.

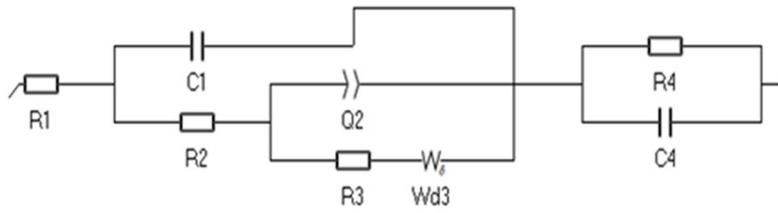
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(a)



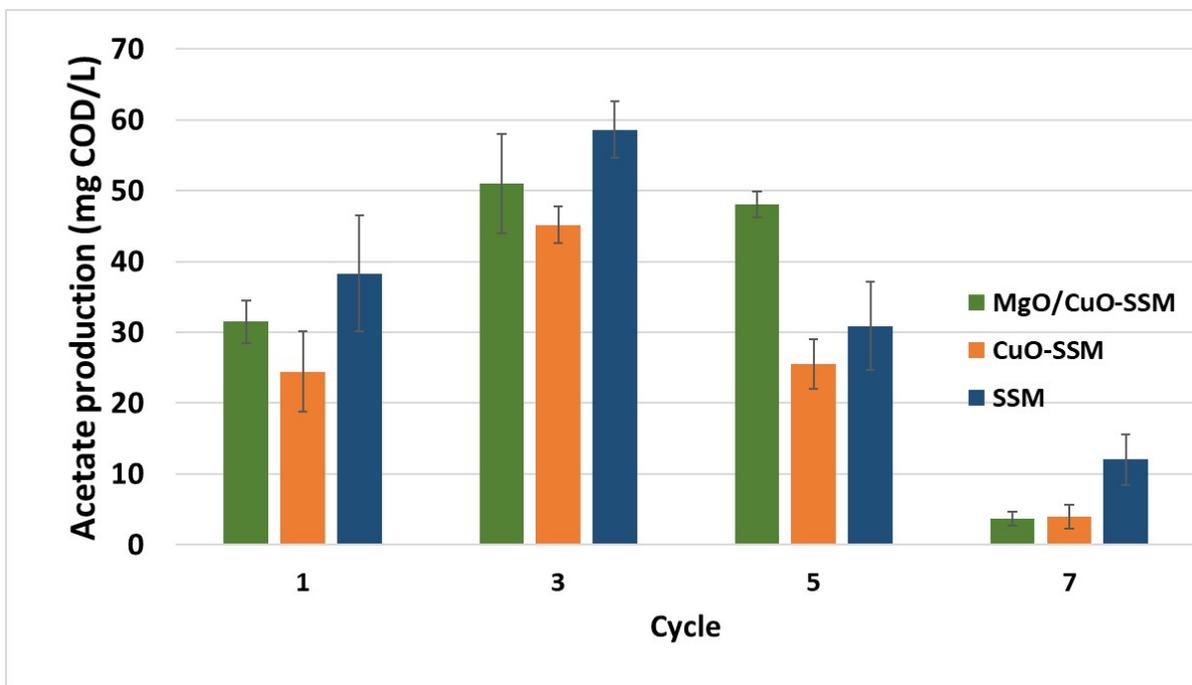
(b)

Resistance (Ω)	MgO/CuO-SSM	CuO-SSM	MgO-SSM	SSM
R_1	3.38 ± 0.02	4.43 ± 0.09	3.91 ± 0.03	8.17 ± 0.32
R_2	1.04 ± 0.04	4.46 ± 0.67	1.05 ± 0.04	5.11 ± 0.87

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Fig. S3 Equivalent circuit used (a) and resistances (b) from EIS fitting.

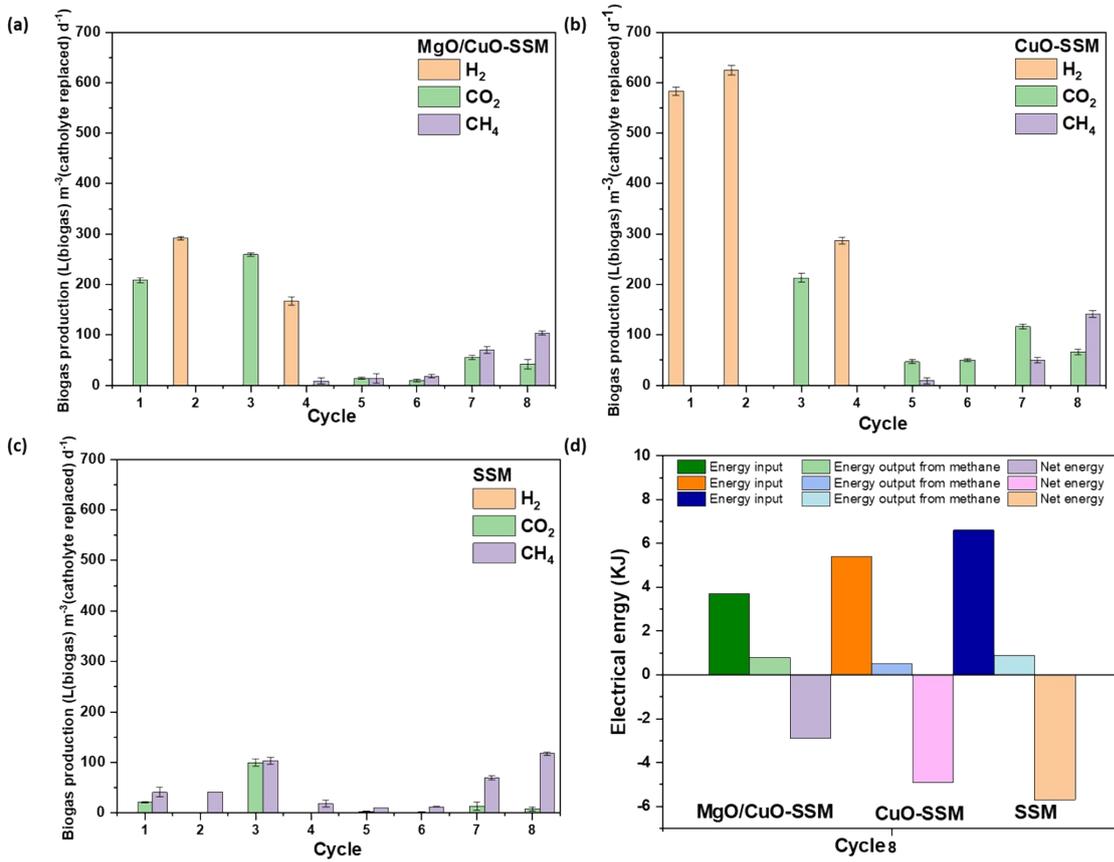
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Fig. S4 Acetate production at the end of batch.

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97 **Fig. S5** (a) Biogas production rates from MES equipped with MgO/CuO-SSM (a), CuO-SSM (b) at -
98 0.9V vs. Ag/AgCl/KCl (sat'd), SSM cathodes at -1V vs. Ag/AgCl/KCl (sat'd) (c), and electrical energy
99 balance for MES reactors-based methane output (d) for Cycle 8.

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