Title:	Direct utilization of industrial carbon dioxide with low impurities for acetate production via microbial electrosynthesis
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Abstract:	The present study aimed to demonstrate the utilization of unpurified industrial CO2 with low impurities for acetate production via microbial electrosynthesis (MES) for the first time. In MES experiments with CO2-rich brewery gas, the enriched mixed culture dominated by Acetobacterium produced 1.8 ± 0.2 g/L acetic acid at 0.26 ± 0.03 g/Lcatholyte/d rate and outperformed a pure culture of Clostridium ljungdahlii (1.1 ± 0.02 g/L; 0.138 ± 0.004 g/Lcatholyte/d). The electron recovery in acetic acid was also more for mixed culture (84 ± 13%) than C. ljungdahlii (42 ± 14%). Electrochemical analysis of biocathodes suggested the role of microbial biofilm in improved hydrogen electrocatalysis. In comparative gas fermentation tests, the mixed culture outperformed C. ljungdahlii and produced acetic acid at a similar level with both industrial and pure CO2 feedstocks. These results suggest the robustness and capability of the mixed microbial community for utilizing slightly impure industrial CO2 for bioproduction and presents a major advancement in MES technology.
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