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SUPPRESSION OF METHANE GAS EMISSION FROM SEDIMENT USING A BIOELECTROCHEMICAL SYSTEM

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Abstract

Sediment microbial fuel cells (SMFCs) were established to evaluate the feasibility of bioelectrochemical systems (BES) technology as a new remediation method to improve the properties of sediment containing organic pollutants and/or substrates of greenhouse gas (GHG) emissions. During an experimental period of over 6 months, power output was generated using carbon/graphite as electrodes. The amount of electricity generated was related to the concentration of microbial biomass in the sediment. Biochemical and molecular-based microbial analysis indicated changes in methanogenic activities in the sediment, implying that the oxidation–reduction potential in the sediment was changed by the installation of electrodes. The BES, in which electrode potentials are arbitrarily set by a potentiostat, demonstrated a certain level of reduction in methane gas emission when the electrodes were set at oxidative potentials. Although this was a laboratory-based experiment, these results suggest that the installation of a BES in the sediment could provide technology for the suppression of GHG emissions in the natural environment.

Key words: bioelectrochemical system, greenhouse gas, electricigens, methanogens, microbial fuel cell

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