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## Supporting information

# Light-driven photosynthetic microbial fuel cell for carbon negative bioelectricity production

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**Running title:** Bioelectricity production of PMFC with carbon-negative process

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## NGS Analysis

After sequencing was completed, Illumina MiSeq raw data was classified by sample using an index sequence, and a paired-end FASTQ file was created for each sample. Cutadapt program was used to remove the sequencing adapter sequence and the F/R primer sequence of the target gene region <sup>1</sup>. In order to correct errors in the Amplicon sequencing process, the R(v4.0.3) [DADA2(v1.18.0)] of the program was used <sup>2</sup>. For paired-end reads, the forward sequence Read1 and the reverse sequence Read2 were cut to 250 bp and 200 bp, respectively, and sequences with an expected error of 2 or more were excluded. After that, the error model for each batch was established and the noise for each sample was removed. After assembling the paired-end sequences with the corrected sequencing error into one sequence, the Consensus method of DADA2 was used to remove the Chimera sequence and formed ASVs. In addition, for comparative analysis of microbial community, QIIME (v1.9) program was used to normalize by applying subsampling based on the number of reads of the sample with the minimum number of reads among all samples <sup>3</sup>. For each ASVs sequence, BLAST+(v2.9.0) was performed in the Reference DB (NCBI 16S Microbial DB), and taxonomy information was assigned to the organism of the subject with the highest similarity <sup>4</sup>. If less than 85% or the identity of the matched domain is less than 85%, taxonomy information is not assigned.

**Fig S1**

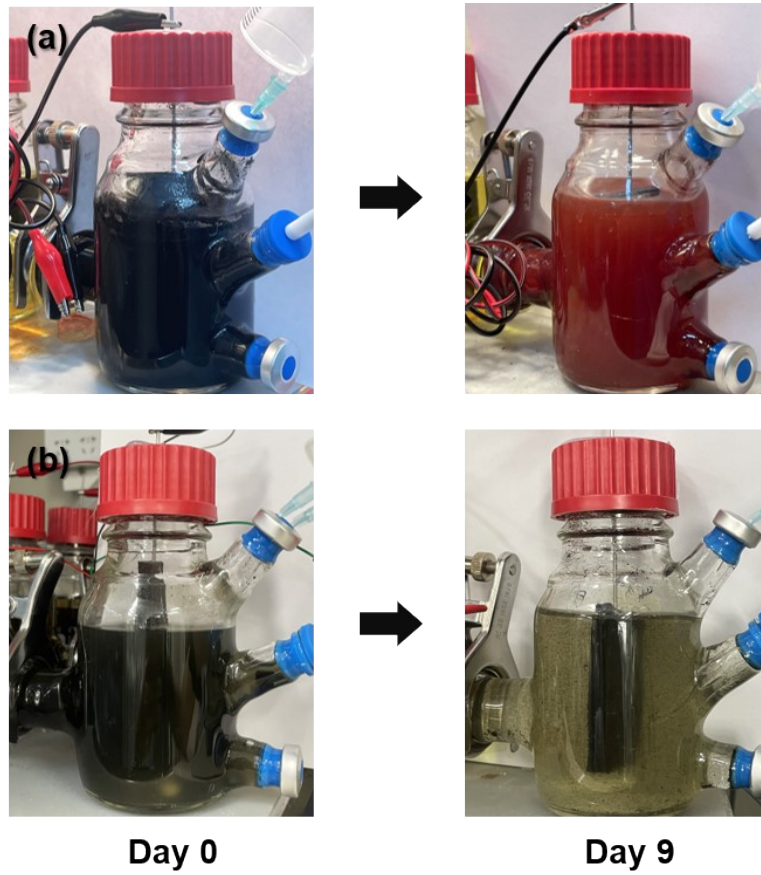


Fig S1. Color change of anolyte in (a) P-MFC, and (b) D-MFC after the enrichment phase. The red color of P-MFC became more thicker as the medium was replaced.

**Fig S2**

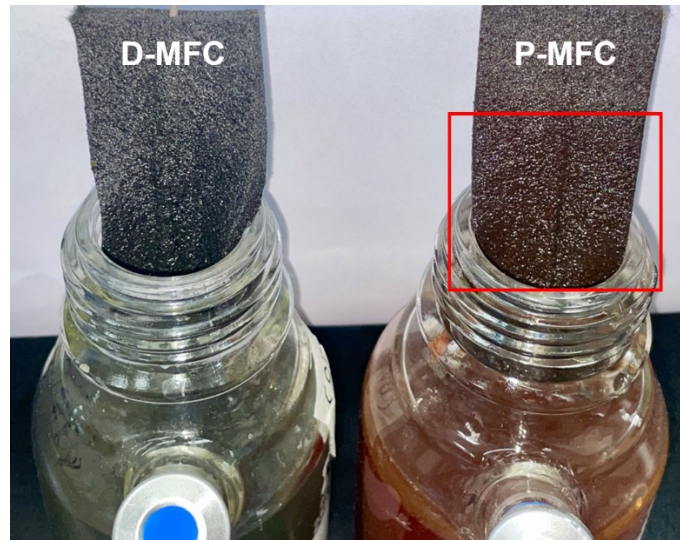


Fig S2. Color change of anode in P-MFC compared to D-MFC after the enrichment phase. It was remained until end of the operation.

**Fig S3**

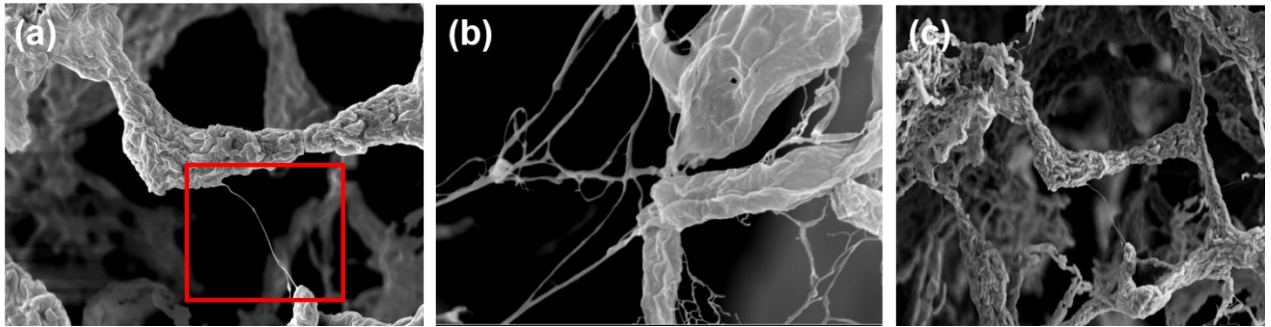


Fig S3. (a, b) Morphology of anode-attached cell of P-MFC in high magnification, and (c) low magnification. Red box indicates nanowire-like structure between cells which can be a function of interspecies electron transfer (IET).

## Reference

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