

Important role of denitrifying exoelectrogens in single-chamber microbial fuel cells after nitrate exposure

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Materials and methods

1. Calculation of electric transfer:

The generated electric charge (E_e , Q), theoretical consumed electric charge of nitrate conversion (E_N , Q), theoretical generated electric charge of acetate (E_A , Q), coulombic efficiency (CE, %), and electron transfer efficiency (ETE, %) were calculated using Eqs. (1)–(5):

$$E_e = \int_0^t I dt \quad (1)$$

$$E_N = \frac{F \times V \times \Delta C \times n}{14} \quad (2)$$

$$E_A = \frac{F \times V \times \Delta COD}{8} \quad (3)$$

$$CE = \frac{32 \times \int_0^t I dt}{F \times V \times \Delta COD \times 4} \times 100 \quad (4)$$

$$ETE = \frac{E_e + E_M}{E_A} \times 100 \quad (5)$$

where I is the current, t is the time, F is the Faraday's constant (96,485 Q/mol), V is the volume, ΔC is the amount of nitrate reduced, n is the electron number, ΔCOD is the amount of COD consumed.

2. The sample treatment for SEM and CLSM

Before SEM testing, the samples were immersed 4 h in 4% glutaraldehyde solution at 4 °C and dehydrated with 50%, 70%, 80% and 90% ethanol, respectively. 10 nm of gold was coated to enhance the conductivity of sample in the SEM. Before CLSM testing, the samples were stained using a live/dead BacLight Viability Kit (L13152, Life Technologies, USA) 20 min and rinsed with 0.1 M PBS solution to eliminate excess dye. CLSM for with 20× objective was used to visualize the spatial live/dead topography of biofilms.

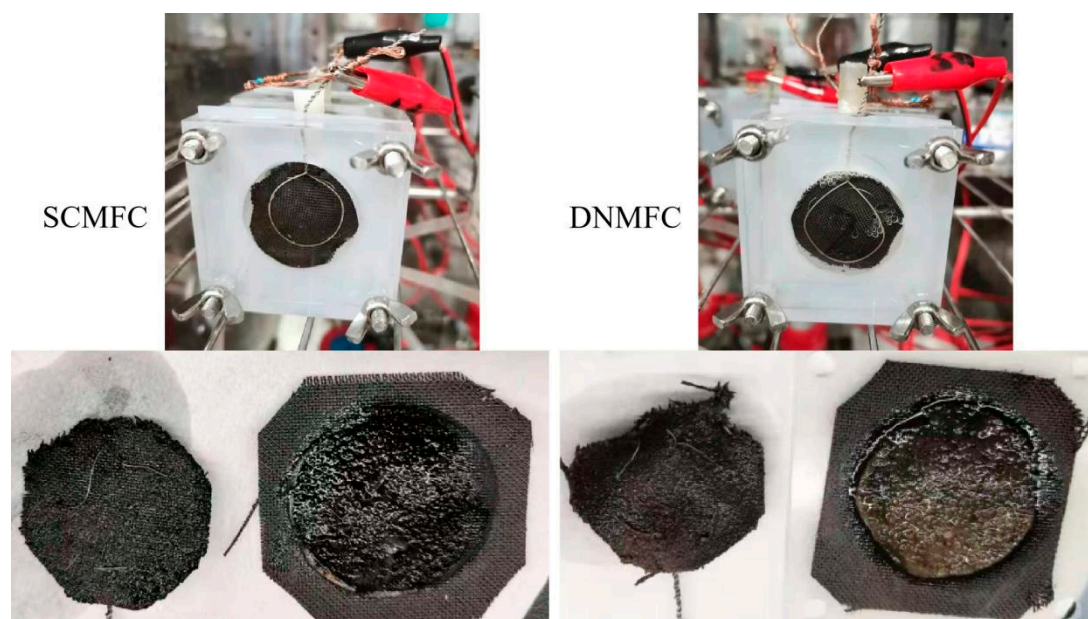


Figure S1. Photos of reactors and electrodes of the SCMFC and DNMFC.

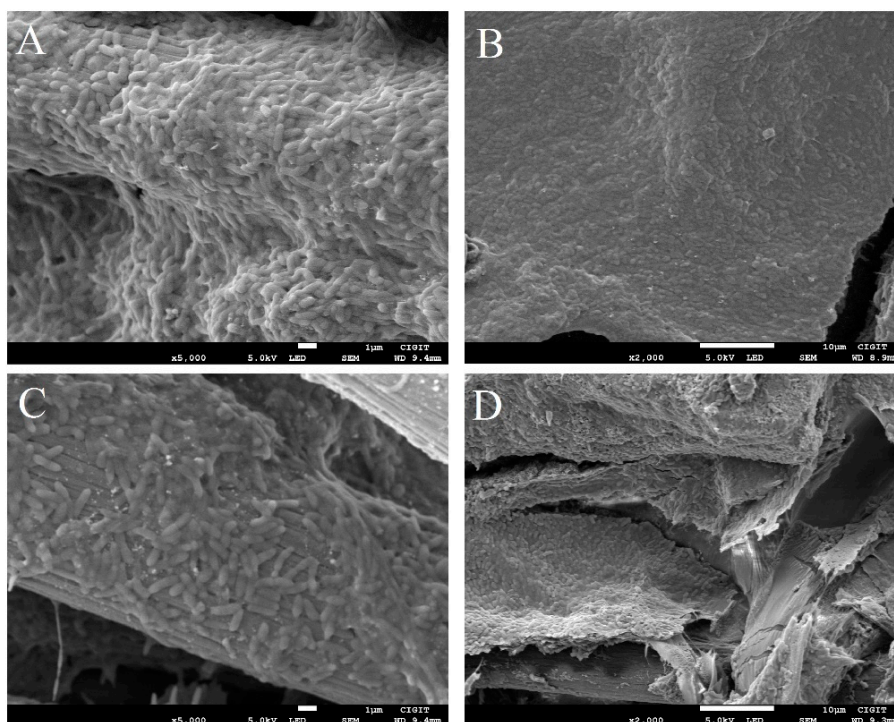


Figure S2. Microbial morphology of electrodes in the DNMFC and SCMFC. Anode (A) and cathode (B) of DNMFC, anode (C) and cathode (D) of SCMFC.