Supporting Information

Enhanced nitrate removal in an Fe^0-driven autotrophic denitrification system using hydrogen-rich water

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Supplemental Materials and Methods

Reactors construction and operation.

Dual-chambered fuel cell used in this study were 54-mm-outside-diameter glass tubing and a 22-mm-outside-diameter pinch clamp assembly. The top of each chamber was sealed with a butyl rubber and thick glove box tape. Electrodes were introduced from the top by feeding a wire through a butyl stopper in the sampling port. The volume of each chamber, with the electrode, was approximately 150 ml of medium with a 50 ml headspace. The chambers were separated with a cation-selective membrane (CEM; CMI-7000, Membrane International Inc., NJ). A carbon brush (25 mm diameter, 25 mm length; 0.22 m2 surface area; fiber type: PANEX 33 160 K, ZOLTEK) was soaked in acetone for 24 h, and heated in muffle furnace at 450 ^{o}C for 60 min before used as the anode electrode. Carbon cloth coated with Pt catalyst layer (10% Pt/C mixed with nafion solution to obtain 0.5 mg Pt/cm^2) on the one side was assembled as cathode electrode, total surface was 7 cm^2.

The activated sludge was colledcted from Gao Beidian water plant (Beijing, China) as the initial inoculation solution. The anode growth medium contained a phosphate buffer (50mM phosphate buffer solution, PBS; $Na_2HPO_4 \cdot 12H_2O$, 11.55 g/L; $NaH_2PO_4 \cdot 2H_2O$, 2.77 g/L; pH=7.0), nutrient solution (NH_4Cl, 0.31 g/L; KCl, 0.13 g/L; trace nutrient medium) and sodium acetate (1.5 g/L) as the carbon source. The cathode medium only contained phosphate buffer (50mM PBS). All of the anode and cathode influent were continuously bubbled with a slow stream of N_2-CO_2 (80:20). All dual-chambered fuel cell were connected to a power source and the applied voltage was 0.8 V.

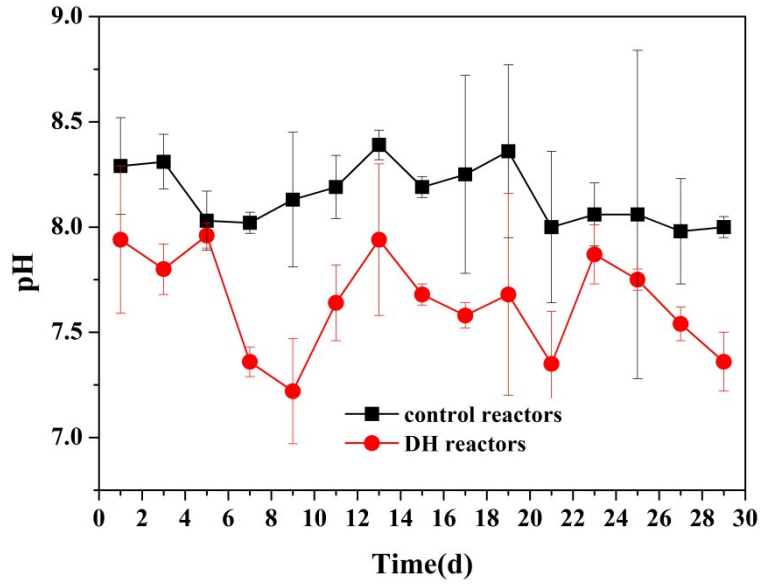

Fig.S1 pH in the effluent of the control and DH reactors