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Performance and microbial community analysis of bio-electrocoagulation on simultaneous nitrification and denitrification in submerged membrane bioreactor at limited dissolved oxygen

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Abstract

A pair of Fe-C electrodes was installed in a traditional submerged membrane bioreactor (MBR, Rc), and a novel asynchronous periodic reversal bio-electrocoagulation system (Re) was developed. The simultaneous nitrification and denitrification (SND) performance was discussed under limited dissolved oxygen (DO). Results showed that electrocoagulation enhanced total nitrogen (TN) removal from 59.48% to 75.09% at 1.2 mg/L DO. Additionally, Fe electrode could increase sludge concentration, particle size, and enzyme activities related to nitrogen removal. The enzyme activities of Hydroxylamine oxidoreductase (HAO), Nitrate Reductase (NAR), nitric oxide reductase NOR and nitrous oxide reductase (N₂OR) in Re were 38.35%, 21.59%, 89.96% and 38.64% higher than Rc, respectively. Moreover, electrocoagulation was advantageous

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