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**Rice husk as carbon source and biofilm carrier for water denitrification**

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In this research, rice husk, a lignocellulosic waste from agro-industry, was investigated as the sole carbon source as well as biofilm carrier in the biological denitrification of wastewater in up-flow laboratory reactors. An artificial wastewater with a temperature in the range of 27–33 °C was used. Fast startup of the reactor and a high nitrate removal efficiency was observed. The highest rates of denitrification about 0.096 kg/m<sup>3</sup> d were achieved when flow rate and nitrate concentration were 41.4 L/d and 25.0 mg/L, respectively. Nitrite accumulation in treated water was practically zero during the experiments. Flow rate and nitrate concentration of the influent were observed to have a significant effect on nitrate removal efficiency. A very sharp decline was observed when the flow rate reached 30 L/d. The reactor had the ability to accommodate a wide range of pH (6.5–8.5) and DO (1.5–4). A time-dependent decrease in nitrate removal rate was observed after 72 days of operation. And the addition of new rice husk brought about a rapid increase of the nitrate removal efficiency. The results showed that rice husk could be an economical and effective carbon source for the nitrate removal process.

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## VII4-P-033

**Electricity generation using nickel foam solely as biocathodic material in a two chambered microbial fuel cell**Xin Wang<sup>1,2</sup>, Yujie Feng<sup>1,2,\*</sup>, Elle Wang<sup>1,2</sup>, Chao Li<sup>1,2</sup>

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With energy crisis coupled with heavy environmental pollution, a confluence of driving forces has created a sustained and significant

worldwide effort to develop new green ways for energy generation. Using autotrophic bacteria as cathodic catalyst instead of Pt is recently reported, which makes microbial fuel cell (MFC) more practical for application in wastewater treatment (Clauwaert et al., 2007). However, the porous electrodes have taken up large percent of capital costs of pilot-scale MFCs. Described here is a preliminary work using nickel foam as biocathodic matrix for electricity generation in MFC instead of carbon-based materials as cathodes. A two-chambered MFC was established and operated in batch mode with a graphite brush anode and an aerated nickel foam cathode (117 cm<sup>2</sup>). Cation exchange membrane made of Ultrex was used as a separator between two electrodes. The analyte was 1 g/L glucose amended with 50 mM phosphate buffer solution (PBS) (Feng et al., 2008) while the catholyte was 2 g/L NaHCO<sub>3</sub> amended with the same PBS. After inoculation, the current output was increased gradually (100 Ω external resistance), and a reproducible maximal current of 1.65 mA was obtained at day 74. Cathodic potential increased obviously with the increase of current, indicating that the cathodic autotrophic microbial community was slowly colonized. During a complete circle, the Ni<sup>2+</sup> concentration of catholyte increased from 0.1 mg/L to 0.5 mg/L, showing that slow corrosion was taken place at cathode. By varying external resistances from 50,000 Ω to 50 Ω, the maximum power density was 4 W/m<sup>3</sup>. Electrical impedance spectroscopy (EIS) results showed that the ohmic resistance was only 2.1 Ω. The cathodic charge transfer resistance (91 Ω) was a factor of 5.5 larger than that of anode (14 Ω), indicating that cathodic overpotential should be decreased in the future.

**Keywords:** Microbial fuel cell; Nickel foam; Electrical impedance spectroscopy; Power output

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## VII4-P-034

**In situ nitrogen removal from tidal river sediment by nitrification/denitrification**Guangwei Yu<sup>1,2</sup>, Lan Qiu<sup>3</sup>, Hengyi Lei<sup>2,\*</sup>, Tao Bai<sup>2</sup>, Qiang Yu<sup>2</sup>, Manwen Zhang<sup>1</sup>

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The effects of in situ nitrogen removal from tidal river sediment by nitrification/denitrification were investigated. In this work, a 20 m channel with river sediments and water was built to simulate irregular half-day tidal river in the Chinese Pearl River Delta area (Yu et al., 2007). After pretreatment, an indigenous activated sludge layer with 4 cm thickness was cultivated and domesticated, and then sediment aerating was used to accelerate the release of nitrogen in sediments to the overlying water and suspend the activated sludge as well (Lei et al., 2007). Finally, the nitrogen in water column was removed by nitrification/denitrification with intermit-