

Synergistic effect of up-flow constructed wetland and microbial fuel cell for simultaneous wastewater treatment and energy recovery

Abstract

This study demonstrated a successful operation of up-flow constructed wetland-microbial fuel cell (UFCW-MFC) in wastewater treatment and energy recovery. The goals of this study were to investigate the effect of circuit connection, organic loading rates, and electrode spacing on the performance of wastewater treatment and bioelectricity generation. The average influent of COD, NO_3^- and NH_4^+ were 624 mg/L, 142 mg/L, 40 mg/L, respectively and their removal efficiencies (1 day HRT) were 99%, 46%, and 96%, respectively. NO_3^- removal was relatively higher in the closed circuit system due to lower dissolved oxygen in the system. Despite larger electrode spacing, the voltage outputs from Anode 2 (A2) (30 cm) and Anode 3 (A3) (45 cm) were higher than from Anode 1 (A1) (15 cm) as a result of insufficient fuel supply to A1. The maximum power density and Coulombic efficiency were obtained at A2, which were 93 mW/m^3 and 1.42%, respectively. © 2015 Elsevier Ltd.

Keywords

Activated carbon as electrodes; Bioelectricity; Membrane-less; Microbial fuel cell; Up-flow constructed wetland