Title: SPEEK/cSMM membrane for simultaneous electricity generation and wastewater treatment in microbial fuel cell

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Abstract: Sulfonated poly (ether ether ketone) (SPEEK) membranes and their modifications are viewed as arguably the most promising in microbial fuel cell (MFC) applications due to their non-fluorinated base, superior chemical stability, and lower costs compared with Nafion membranes. In this work, SPEEK membranes with different degrees of sulfonation (DSs) (60% to 76%) and blended with charged surface modifying macromolecule (cSMM) were used as electrolytes in an MFC for simultaneous electricity generation and wastewater treatment. RESULTS: Performance evaluation of newly fabricated membranes was carried out and was compared with that of Nafion 117. The MFC with SPEEK76/cSMM generated about 16.5% higher maximum power density (172.1 mW m-2) than that with Nafion 117 (143.7 mW m-2). In addition, the SPEEK76/cSMM exhibited the highest coulombic efficiency (CE) of 17.6%, which was 21.6% higher than that of Nafion 117 (13.8%). Chemical oxygen demand (COD) removal of all characterized membranes was above 80% in our particular MFC. CONCLUSION: MFC is a suitable method for simultaneous wastewater treatment and electricity generation. SPEEK76/cSMM is a promising membrane to be applied in MFC. © 2014 Society of Chemical Industry.