Effect of Basic Fluid Dynamics Parameters on Power Generation and Landfill Leachate Treatment Capacity of Biofillter-Microbial Fuel Cells

Songyot Mongkulphit and Petch Pengchai

Biofiltration is one of many promising low-cost technologies for wastewater treatment. Recently, we were able to generated electricity during wastewater treatmentby adding graphite plates to a biofilter. Our single cell Biofillter-Microbial Fuel Cell (B-MFC) demonstrated an Open Circuit Voltage (OCV) of 0.51-0.67 V as well as removing 76 % COD with a 5.5 hour HRT period (Singtong et al., 2016).However, our power density was below 0.1 W/m^3. Fluid dynamics parameters, such as shear force was found important for increasing the MFC output power. Pham et al. (2008) reported that increasing shear rate to 120 s^{-1} lead to a power 2-3 times higher than at a 0.3 s^{-1} shear rate. However, the power decreased for shear rates above 120 s^{-1} (Pham et al., 2008). In this research, we aim to investigate the effect of basic fluid dynamics parameters on the generation of electricity power and pollutant removal of MFCs during synthetic landfill leachate treatment. Flow rate, shear stress, HRT and OLR that affect power and removal efficiency will be discussed. For pollutant removal, COD, BOD, ammonia, nitrate, DO, pH, ORP will be analyzed. OCV, polarization curve and internal resistance will be monitored to assess power output.

Email address : songyotmongkulphit@gmail.com