

## Bioelectricity Generation from Bamboo Leaves Waste in a Double Chambered Microbial Fuel Cell

(Penjanaan Bioelektrik daripada Sisa Daun Buluh dalam Sel Bahan Api Mikrob Dua Kebuk)

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### ABSTRACT

This study investigated the utilization of bamboo leaf waste and two varieties of bacterial sources, chicken manure and effective microorganism, in a microbial fuel cell (MFC) at three substrate concentrations (40 g/liter, 80 g/liter, and 160 g/liter). The primary objective was to investigate the kinetics of bacterial growth at various substrate concentrations in the MFC, as well as the effect of light conditions and pH on MFC power generation. The MFC had dual chambers with graphite electrodes serving as the cathode and anode. Within 72 h, the highest power density of 90.05 mV was attained using the highest substrate concentration of bamboo leaf waste and chicken manure during the logarithmic growth phase, albeit with a shorter duration. The longest sustained phase of bacterial activity was observed during the stationary phase, at the highest substrate concentration of 160 g/liter, followed by 80 g/liter and 40 g/liter. These results indicate that the logarithmic phase is the optimal time for bacterial activity in the MFC. However, attaining long-term stability in power generation in the logarithmic phase requires careful parameter optimization.

Keywords: Bamboo leaves; bioelectricity generation; chicken manure; Microbial Fuel Cell; substrate concentration

### ABSTRAK

Penyelidikan ini mengkaji penggunaan sisa daun buluh dan dua jenis punca bakteria, tahi ayam dan mikroorganisma berkesan, dalam sel bahan api mikrob (MFC) pada tiga kepekatan substrat (40 g/liter, 80 g/liter dan 160 g/liter). Objektif utama adalah untuk mengkaji kinetik pertumbuhan bakteria pada pelbagai kepekatan substrat dalam MFC, serta kesan keadaan cahaya dan pH pada penjanaan kuasa MFC. MFC mempunyai dua ruang dengan elektrod grafit berfungsi sebagai katod dan anod. Dalam masa 72 jam, ketumpatan kuasa tertinggi 90.05mV telah dicapai menggunakan kepekatan substrat tertinggi sisa daun buluh dan baja ayam semasa fasa pertumbuhan logaritma, walaupun dengan tempoh yang lebih singkat. Fasa paling lama berterusan aktiviti bakteria diperhatikan semasa fasa pegun, pada kepekatan substrat tertinggi 160 g/liter, diikuti oleh 80 g/liter dan 40 g/liter. Keputusan ini menunjukkan bahawa fasa logaritma adalah masa yang optimum untuk aktiviti bakteria dalam MFC. Walau bagaimanapun, untuk mencapai kestabilan jangka panjang dalam fasa logaritma untuk penjanaan kuasa memerlukan pengoptimuman parameter yang teliti.

Kata kunci: Baja ayam; daun buluh; kepekatan substrat; penjanaan bioelektrik; sel bahan api mikrob