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Enhancement of Bioelectricity Generation and Algal Productivity in Microbial Carbon-Capture Cell using Low Cost Coconut Shell as Membrane Separator

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HIGHLIGHTS

- Use of coconut shell (CS) as proton exchange membrane is proposed
- Presence of hygroscopic oxides and pore structure in CS favour transfer of protons
- MCC with CS membrane gave better power density and CE than MCC with Nafion
- Enhanced algal growth observed in the cathodic chamber of MCC using CS separator

Abstract

Proton exchange membranes (PEMs) are the most prominently used separator in microbial fuel cell (MFC) and microbial carbon capture cell (MCC). This study aims at evaluating the characteristics of coconut shell (CS) to explore its potential as a PEM. The CS exhibited superior water absorption (32 %), which can stimulate the proton transmission through water molecules to the cathodic chamber. The proton conductivity of CS separator was comparable to Nafion 117; however, the oxygen mass transfer coefficient of CS separator was lower than Nafion 117, indicating it as superior separator. These separators were used in MCC with

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