Production of Electricity from Rice Straw with different Pretreatment Methods Using a Sediment Microbial Fuel Cell

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The purpose of this study is to improve the performance of solid phase microbial fuel cells (SMFC) by pretreating straw with several reagents (H_2SO_4 , NaOH and H_2O_2). Electrochemical performance and straw properties were measured. The results show that when compared with the control group (untreated rice straw), the SMFC with rice straw after hydrogen peroxide pretreatment (SMFC- H_2O_2) and the SMFC with rice straw after sulfuric acid pretreatment (SMFC- H_2SO_4) lasted more than 6 to 8 days under high voltage (higher than 500 mV). Furthermore, an SMFC with rice straw after sodium hydroxide pretreatment (SMFC-NaOH) can last more than 22 days under high voltage, which is almost twice the endurance of the control group. The maximum power density of the SMFC-NaOH was 140 mW/m^2 on day 50, which was 3.6 times that of the control. Therefore the NaOH pretreatment worked in favor of rice straw biodegradation by anaerobic microorganisms and extended the sustained discharge time of the SMFC.

Keywords: Straw resource utilization; Electricity; Long discharge; Cellulose; Pretreatment

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