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

Tian-shun Song¹,²,³,⁴, Shuai Hou¹,³, Jiguang Zhang¹,³, Haoqi Wang¹,³, Jingjing Xie¹,²,³,⁴,*

¹ State Key Laboratory of Materials-Oriented Chemical Engineering, Nanjing Tech University, Nanjing 211816, PR China
² CAS Key Laboratory of Bio-based Materials, Qingdao Institute of Bioenergy and Bioprocess Technology, Chinese Academy of Sciences, Qingdao 266101, China
³ College of Life Science and Pharmaceutical Engineering, Nanjing Tech University, Nanjing 211816, PR China
⁴ Jiangsu National Synergetic Innovation Center for Advanced Materials (SICAM), Nanjing 211816, PR China
*E-mail: xiej@njtech.edu.cn
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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 (H₂SO₄, NaOH and H₂O₂). 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-H₂O₂) and the SMFC with rice straw after sulfuric acid pretreatment (SMFC-H₂SO₄) 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/m² 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

FULL TEXT

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