Abstract

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Improved Production of Cellulosic Bioethanol using Miscanthus Hydrolysate by Engineered Saccharomyces cerevisiae

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Abstract

In order to industrialize bioethanol based on cellulosic biomass, securing economic efficiency is very important. Until now, fermentation using glucose converted from cellulose through pretreatment and saccharification process was mainly performed, resulting in economically lower efficiency. The industrialization of strains capable of metabolizing xylose produced from cellulosic biomass was insufficient. Recently, an engineered Saccharomyces cerevisiae was developed for the effective bioethanol production. In this study, the yield of ethanol production was investigated using engineered Saccharomyces cerevisiae capable of xylose metabolism. The raw materials was pretreated with a twin-screw extrusion reactor under conditions: 0.5 M NaOH 27 L/h, biomass feeding 4.5 kg/h at 99. The production of substrates for the ethanol fermentation was produced 120 g / L of glucose and 40 g / L of xylose through alkaline pretreatment and saccharifica-tion. In result, 65 g/L of ethanol in 48 h from Miscanthus hydrolysate was obtained using engineered Saccharomyces cerevisiae capable of xylose metabolism. In conclusion, the yield of ethanol production was improved 40% from 46 g/L to 65 g/L with same substrate. Recent Publications 1. Young-lok Cha, Jungwoo Yang, Yuri Park, Gi Hong An, Jong-woong Ahn, Youn-ho Moon, Young-mi Yoon, Gyeong-dan u, In-hu Choi (2015) Continuous alkaline pretreatment of Miscanthus sacchariflorus using a benchscale single screw reactor. Bioresource Technology 181:338-344. 2. Young-lok Cha, Jungwoo Yang, Sun-il Seo, Gi Hong An, Youn-ho Moon, Gyeong-dan Yu, Ji-Eun Lee, Jong-woong Ahn, Kyeong-Bo Lee(2016) Alkaline twin-screw extrusion pretreatment of Miscanthus with recycled black liquor at the pilot scale. Fuel 164:322-328. 3. Yamada R., Taniguchi N., TanakaT., Ogino C., Fukuda H., Kondo A. (2011) Direct ethanol production from cellulosic materials using a diploid strain of Saccharomyces cerevisiae with optimized cellulose exprestion. Biotechnol. Biofuels. 4:1-9. 4. Kim S. R., Park, Y.C., Jin Y.S., Seo J.H. (2013) Strain engineering of Saccharomyces cerevisiae for enhanced xylose metabolism. Biotechnol. Adv. 31:851-861. 5. Ye-Gi Lee, Yong-su Jin, Young-lok Cha, Jin-ho Seo (2017) Bioethanol production from cellulosic hydrolysates by engineered industrial Saccharomyces cerevisiae. Bioresocurce Technology 228:355-361.

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Biography

Young-Lok Cha was a doctorate at the University of Hannover in Germany. He is working as a senior researcher at the National Institute of Crop Science, Rural Development Administration in Korea and his major is the development of lignocellulosic biomass conversion technology and biofuels production at pilot scale.

