

12<sup>th</sup> World Congress on **Biofuels and Bioenergy**  
&  
13<sup>th</sup> Global Summit and Expo on **Biomass and Bioenergy**  
September 04-06, 2018 | Zurich, Switzerland

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

Young-Lok Cha<sup>1</sup>, Yong-ho Moon<sup>2</sup>, Kwang-soo Kim<sup>3</sup>, Ji-eun Lee<sup>4</sup>, Da-eun Kwon<sup>5</sup> and Yong-ku Kang<sup>6</sup>  
<sup>1,2,3,4,5,6</sup> Bioenergy Crop Research Institute, National Institute of Crop Science, Republic of KOREA

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 °C. 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 saccharification. 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 bench-scale 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 expression. *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*. *Bioresource Technology* 228:355-361.

### 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.

biocha@korea.kr

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