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Complete saccharification of cellulose through chemoenzymatic hydrolysis

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A new methodology for the total cellulose hydrolysis using a chemo-enzymatic system of combining chemical depolymerization process and enzymatic hydrolysis was described in this paper. The approach undertaken herein involves the dissolution of cellulose in an ionic liquid (IL), depolymerization by acidic solid catalyst, and obtained total cellooligomers aided by antisolvent. The yield of soluble cello-oligomers from cellulose depolymerization was 81.1% under 81.3% conversion and recovery of 99.8% treated with 1.5% AMB at 100 °C for 1 h. Followed by the chemical depolymerization, all of the total soluble cellooligomers which are longer as in molecular length than cello-biose extracted from the reaction mixture was virtually hydrolyzed to the glucose by the β -1,4-D-glucon glucohydrolase identified from a *Paenibacillus sp.* HPL-001, which is different to other commercialized β -1,4-D-glucosidase. Continuous recycling of 99% of ionic acid and organic solvent completely breaks down the cellulose to soluble sugars shorter than 6 AGU cellooligomers. The efficiency of this technology could compromise the dissolution and selective deconstruction problem for a crucial step in the production of glucose as final product without further degradation from cellulose as an alternative techno-economic process against traditional expensive three-enzymatic hydrolysis.

Biography

In Taek Hwang has completed his PhD from Chonbuk National University in Korea and Postdoctoral studies from Virginia Poly-Tech Institute and State University. He has been a Principal Research Scientist at Korea Research Institute of Chemical Technology (KRICT) since 2000 and Research Fellow in 2013. He has been an Adjunct Professor of the Department of Green Chemistry & Environmental Biotechnology, University of Science & Technology (UST) in Korea since 2010. His current research work is focused on the biochemical conversion in the biorefinery process, especially, discovery of enzymes and chemo-enzymatic bio-catalysis. He has published more than 30 papers in reputed journals and has been teaching studients as an professor of UST.

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