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Large scale production of 2-pyrone-4, 6-dicarboxylic acid as a platform chemical from lignin

Yuichiro Otsuka[1], Masaya Nakamura[1], Ronald R Navarro[1], Eiji Masai[2], Koki Kameyama[2], Toshiji Kameyama[3] and **Yoshihiro Katayama[4]**
[1]Forestry and Forest Products Research Institute, Japan
[2]Nagaoka University of Technology, Japan
[3]Kantechs Co Ltd., Japan
[4]Nihon University, Japan

Lignin is the most abundant aromatic biomass polymers in nature. Utilization of this abundant biomass for high value products however is limited and associated with lignin processing. One practical way to utilize lignin is to convert it using the chemical or enzymatic reactions to produce utilizable monomers such as vanillin for flavorings or even bio-based feedstocks for bioplastics and other useful chemicals. Typically, though lignin extraction processes produce a wide range of aromatic compounds ranging from vanillin to vanillic acid, syringaldehyde, syringic acid and other mono- or di- aromatic compounds. Although there is some value to these chemicals, the target compounds must be purified, often requiring complex separation procedures. A more efficient system to utilize waste lignin, while producing a purer stream of high value products would be desirable. The soil bacterium, *Sphingobium* sp., SYK-6, is able to degrade various low molecular weight compounds derived from lignin and to metabolize these low molecular weight compounds to produce 2-pyrone-4,6-dicarboxylic acid (PDC). We focused on this metabolic intermediate as a raw material for the potential production of novel bio-based polymers. We have established a technology to produce PDC as a platform chemical from lignin monomers using bacterial metabolic engineering technology. In this study, we have also established large scale process for producing PDC from vanillic acid by using metabolome technology. Finally, we have successfully produced PDC about 80 kg from vanillic acid by single batch fermentation.

Biography

Yuichiro Otsuka has completed his PhD from Tokyo University of Agriculture and Technology and Postdoctoral studies at Jikei University School of Medicine. He is the Senior Researcher of Forestry and Forest Products Research Institute.

yotuka@ffpri.affrc.go.jp

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