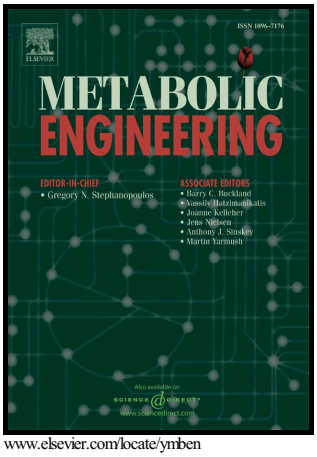

www.elsevier.com/locate/ymben

From lignin to nylon: Cascaded chemical and biochemical conversion using metabolically engineered Pseudomonas putida

Michael Kohlstedt, Sören Starck, Nadja Barton, Jessica Stolzenberger, Mirjam Selzer, Kerstin Mehlmann, Roland Schneider, Daniel Pleissner, Jan Rinkel, Jeroen S. Dickschat, Joachim Venus, Jozef N.J.H. van Duuren, Christoph Wittmann

PII: S1096-7176(17)30461-5
DOI: https://doi.org/10.1016/j.ymben.2018.03.003
Reference: YMBEN1357

To appear in: *Metabolic Engineering*

Received date: 11 December 2017
Revised date: 2 March 2018
Accepted date: 4 March 2018

Cite this article as: Michael Kohlstedt, Sören Starck, Nadja Barton, Jessica Stolzenberger, Mirjam Selzer, Kerstin Mehlmann, Roland Schneider, Daniel Pleissner, Jan Rinkel, Jeroen S. Dickschat, Joachim Venus, Jozef N.J.H. van Duuren and Christoph Wittmann, From lignin to nylon: Cascaded chemical and biochemical conversion using metabolically engineered Pseudomonas putida, *Metabolic Engineering,* https://doi.org/10.1016/j.ymben.2018.03.003

From lignin to nylon: Cascaded chemical and biochemical conversion using metabolically engineered *Pseudomonas putida*

Michael Kohlstedt[1], Sören Starck[1], Nadja Barton[1], Jessica Stolzenberger[1], Mirjam Selzer[1], Kerstin Mehlmann[3], Roland Schneider[3], Daniel Pleissner[3], Jan Rinkel[2], Jeroen S. Dickschat[2], Joachim Venus[3], Jozef N.J.H. van Duuren[1], Christoph Wittmann[1*]

[1] Institute of Systems Biotechnology, Saarland University, Germany

[2] Kekulé-Institute for Organic Chemistry and Biochemistry, University of Bonn, Germany

[3] Leibniz Institute for Agricultural Engineering and Bioeconomy, Potsdam, Germany

[*]Correspondence address: Campus A 1.5, 66123 Saarbrücken, Germany; Phone: +49-681-302-71970; Fax: -71972. christoph.wittmann@uni-saarland.de

Abstract

Cis,cis-muconic acid (MA) is a chemical that is recognized for its industrial value and is synthetically accessible from aromatic compounds. This feature provides the attractive possibility of producing MA from mixtures of aromatics found in depolymerized lignin, the most underutilized lignocellulosic biopolymer. Based on the metabolic pathway, the catechol (1,2-dihydroxybenzene) node is the central element of this type of production process: (i) all upper catabolic pathways of aromatics converge at catechol as the central intermediate, (ii) catechol itself is frequently generated during lignin pre-processing, and (iii) catechol is directly converted to the target product MA by catechol 1,2-dioxygenase. However, catechol is highly toxic, which poses a challenge for the bio-production of MA. In this study, the soil bacterium *Pseudomonas putida* KT2440 was upgraded to a fully genome-based host for the production of MA from catechol and upstream aromatics. At the core of the cell factories created was a designed synthetic pathway module,