Enlisting bacteria to make your nylon for you

February 10, 2020

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Using bacteria to convert sugars into “green” products, such as polymer precursors for nylon or PET, is a task keeping metabolic engineers up at night, but thanks to a specially designed biosensor from Los Alamos, the task is far simpler now.

Working with a promising soil bacterium, *P. putida KT2440*, a Los Alamos team, in collaboration with two other national laboratories (NREL and ORNL), found a way to identify and delete three genes of the *P. putida* genes that were making the production of muconate difficult. “Using the LANL-created biosensor we were able to screen the microbe for both growth and muconate production simultaneously” said Niju Narayanan, a lead contributor to this research. Muconate is vital to the non-petrochemical production of polymer products such as nylon and PET.

“As far as we know, this work presents the highest muconate titers and productivities from glucose by engineered *P. putida* reported to date,” said Ramesh Jha, technical lead for LANL’s effort on the project, which is part of the Agile BioFoundry, a multi-national lab consortium funded by DOE Office of Energy Efficiency and Renewable Energy’s Bioenergy Technologies Office (BETO). “Improving productivity by 3-fold was made possible with Smart Microbial Cell Technology, producing a commodity chemical with a world market value of more than $40 Billion dollars,” said Jha.

“We are thrilled to demonstrate a new way to apply biosensors for microbial strain development and improvement,” shared Taraka Dale, LANL principal investigator for the Agile BioFoundry. “In addition to BETO, we also have the LANL LDRD program to thank, as it supported our initial development of this particular sensor.”

The work was recently published online in the journal *Metabolic Engineering* and will be available in print in the May 2020 issue.