LanzaTech

LanzaTech, Northwestern University, Yale University, and NREL to Establish New Center for Multi-Scale Synthetic Biology

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Supported by the U.S. Department of Energy, the new center will develop a multi-scale Synthetic Biology resource to accelerate biosystems design for carbon-negative biomanufacturing

The U.S. Department of Energy (DOE) recently announced $178 million for bioenergy research to advance sustainable technology breakthroughs that can improve public health, address climate change, improve food and agricultural production, and create more resilient supply chains.

A team from Northwestern University, LanzaTech NZ, Inc. (LanzaTech), Yale University, and National Renewable Energy Laboratory (NREL) received $18.5 Million in funding from this grant for integrating cell-free systems and genome engineering to accelerate biosystems design for carbon-negative biomanufacturing. With the DOE grant by the Office of Biological and Environmental Research (BER) Genomic Sciences Program (GSP), the research team will work to,

- Interweave *in vivo* and *in vitro* approaches, developing new Synthetic Biology tools and Artificial Intelligence (AI) models,
- Establish a predictive, system-level understanding of CO_2-utilizing biosystems to accelerate sustainable biomanufacturing, and
- Engineer industrially relevant CO_2-utilizing biosystems that produce advanced and performance-advantaged fuels and chemical precursors.

The work will look to understand the fundamental rules that drive microbial systems and how they can make new products through biological design. This is expected to help support new approaches to biomanufacturing by developing performance-advantaged alternatives to materials, fuels, and solvents today exclusively made from virgin fossil inputs.

LanzaTech has already demonstrated more than 100 products through its Synthetic Biology platform. CEO Dr. Jennifer Holmgren recently spoke at the White House Summit on Biotechnology and Biomanufacturing, where she shared her vision for a post-pollution future. “By 2040,” Dr. Holmgren said, “we hope that every U.S. consumer, regardless of where they are from or how much they earn, will have direct access to a sustainable version of every product they purchase.”

“Innovation alone will not be enough to accelerate the work we are doing in creating a circular economy,” Holmgren said. “However, through collaboration and the support of the Department of Energy, we will be able to scale our work and have several platforms to support the growing carbon-negative biomanufacturing industry.”

Northwestern University and LanzaTech have a long history of collaboration. This work builds upon a Biosystems Design award Northwestern University and LanzaTech received that demonstrated ground-breaking work on how *in vitro* prototyping of biochemical pathways can accelerate design of biological cell-factories and carbon-negative biomanufacturing of essential platform chemicals acetone and isopropanol. Professor Michael Jewett, Walter P. Murphy Professor of Chemical and Biological Engineering at Northwestern University and Director for Northwestern University’s Center of Synthetic Biology, will lead the project.

“We need to advance and apply our capacity to partner with biology to make what is needed, where and when it is needed, on a sustainable and renewable basis,” Jewett said. “This project will allow us to grow US-based manufacturing through fundamental research insights.”

The DOE funding supports cutting-edge biotechnology R&D, like that with LanzaTech and the interdisciplinary team assembled. According to the DOE, “Alternative clean energy sources like bioenergy are playing a key role in reaching President Biden’s goal of a net-zero carbon economy by 2050.” U.S. Secretary of Energy Jennifer M. Granholm said in a recent news release announcing the funding, “These projects will continue to advance the boundaries of biotechnology and support the emergence of a thriving U.S. bioeconomy that creates good-paying jobs and helps us meet our climate goals.”

“We are reimagining a world that frees ourselves from relying on fossil resources,” Holmgren said. “The work we are doing with Northwestern University, Yale, and the National Renewable Energy Laboratory is preparing ourselves for a post-pollution future and a more circular economy.”