Agile BioFoundry

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

BIOENERGY TECHNOLOGIES OFFICE

DOE Bioenergy Technologies Office (BETO)
2023 Project Peer Review

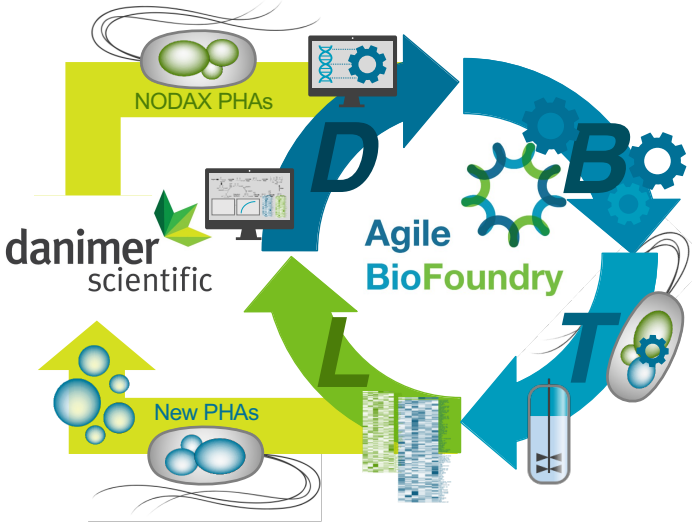
ABF Industry Engagement Lab Call with Danimer Scientific

Date: April 5th, 2023
Technology Area Session: Agile BioFoundry

National Laboratory PI: Gregg T. Beckham
Danimer PI: Carol Leggett

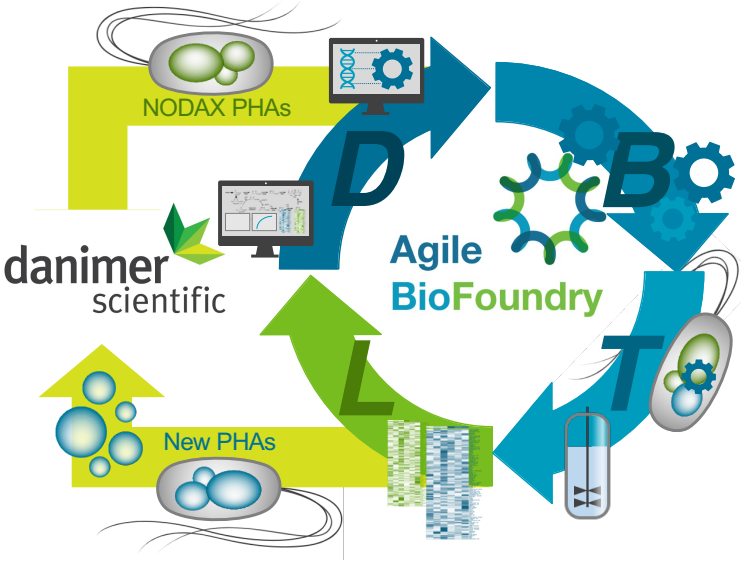
Project overview

- **Goal:** Develop designer PHAs in an industrially relevant host for scale-up
- **Motivation:** Microbial PHAs can access new materials properties and corresponding applications based on side chain length and composition, including new applications of interest to Danimer
- Project started October 2021



Approach for project

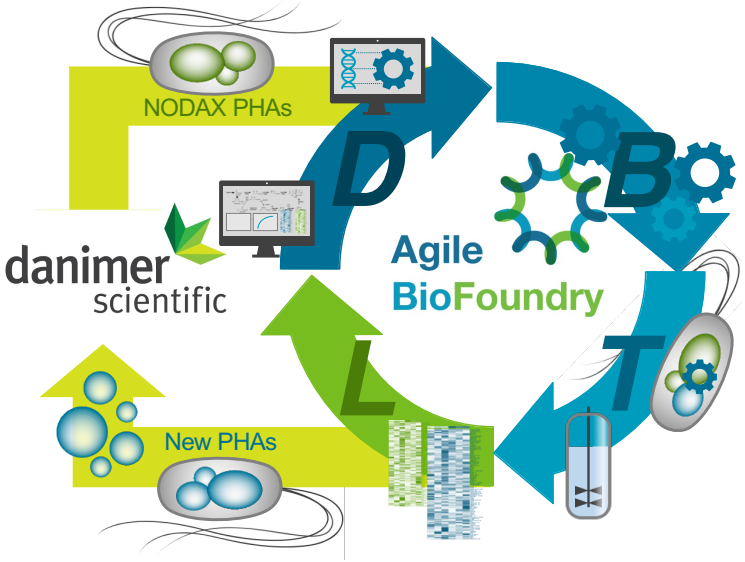
- Leverage work on fatty acid biosynthesis in *P. putida* KT2440[1]
- Engineer Danimer strains to tune PHA composition to desirable properties
- Use computational biology approaches in concert with systems biology tools to make strain modifications
- Metabolomics to identify and eliminate production of off-target compounds
- Bioprocess development at Danimer



1. McNaught, Kuatsjah *et al., Metabolic Engineering* 2023

Progress and outcomes

- On-boarded Danimer strains
- Conducting iterative strain engineering and PHA characterization with GC-based methods
- Will send samples for –omics measurements in spring 2023
- Developing parallel pathways in ABF host, *Pseudomonas putida* KT2440, as a “transfer target”
- 18/24 month complete



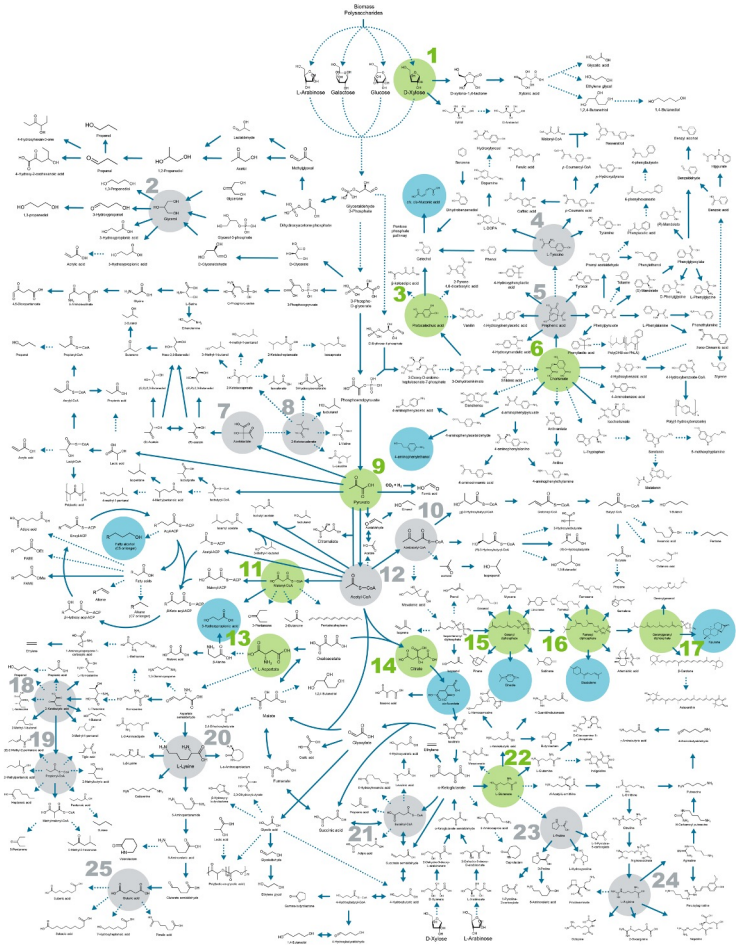
Impact

Scientific

- Working to develop new PHA formulations that have not been reported in the literature and that could lead to new material properties for PHAs

Industry

- Working with Danimer to scale-up technology



Quad chart overview

Timeline

- Project Start: 10/1/2021
- Project End: 9/30/2023

	FY22 costed	Total Award (FY22-23)
DOE Funding	$ 255,000 PNNL - $70k NREL – $185k	$ 500,000 PNNL - $130k NREL – $370k
Cost Share (Danimer)		

Project Goal

Develop designer PHAs in an industrially relevant host for scale-up

End of Project Milestone

Demonstrate polymer composition by tuned strain within 10% of target composition (75% C4 and 25% C8, C10, and/or C12) & CRADA Final Report

Funding Mechanism

FY20 ABF Directed Funding Opportunity

Project Partners

ABF Labs: NREL, PNNL

Industry Partner: Danimer Scientific

TRL at Project Start: 2

TRL at Project End: 3

Acknowledgements:
DOE Technology Manager Gayle Bentley

Project Contributors:
NREL: Christopher Johnson, Megan Krysiak, Michelle Reed, Gabriel Rubinstein

PNNL: Kristin Burnum-Johnson, Young-Mo Kim, Jon Magnuson

Danimer Scientific: Carol Leggett, Phil Van Trump