



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

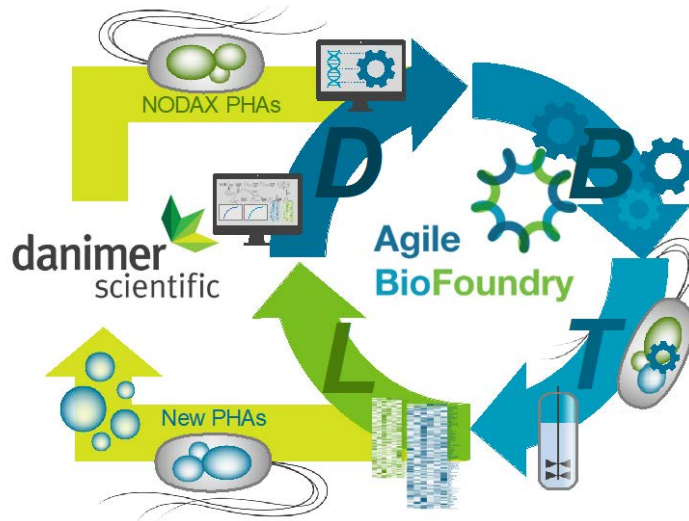
Danimer PI: Carol Leggett

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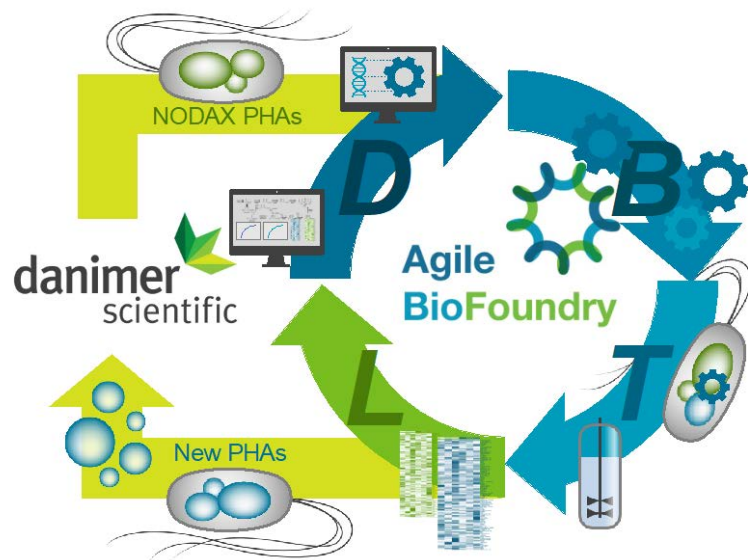
Project overview

- **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

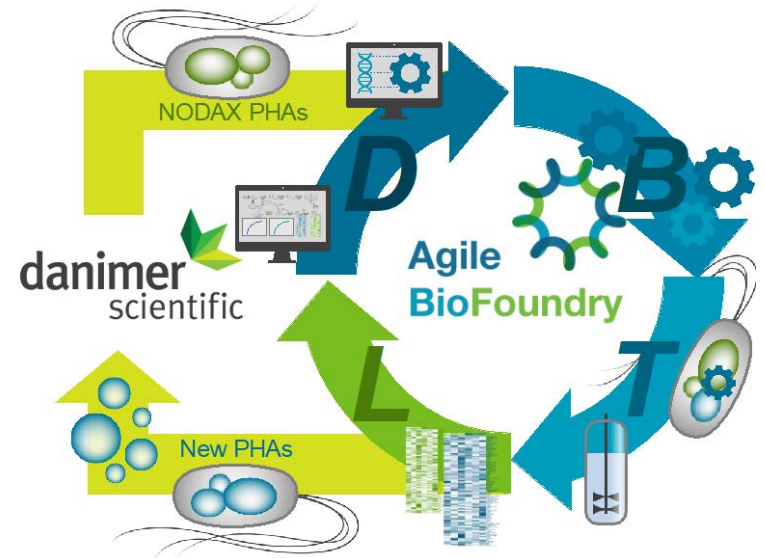
- Leverage work on fatty acid biosynthesis in *P. putida* KT2440¹
- Engineer Danimer strains to tune PHA composition to desirable properties
- Use computational biology approaches in concert with systems biology tools to make strain modifications
- Metabolomics to identify and eliminate production of 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



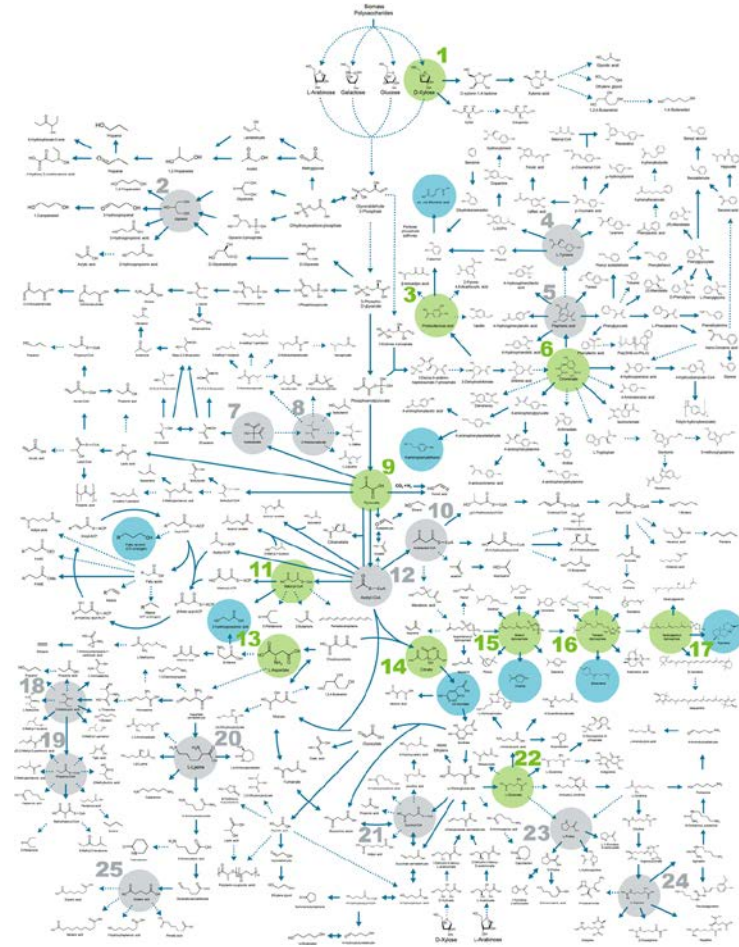
Impact

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) | \$62,500 | \$125,000 |

Project Partners

ABF Labs: NREL, PNNL

Industry Partner: Danimer Scientific

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

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

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