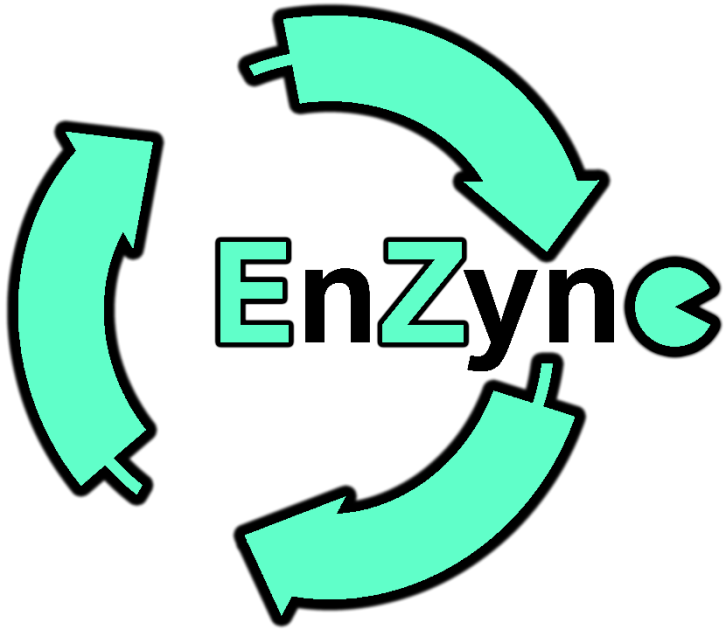
18th January 2023

Inauguration of



Centre for enzymatic deconstruction of thermoset plastics for a sustainable society

novo nordisk **fonden**

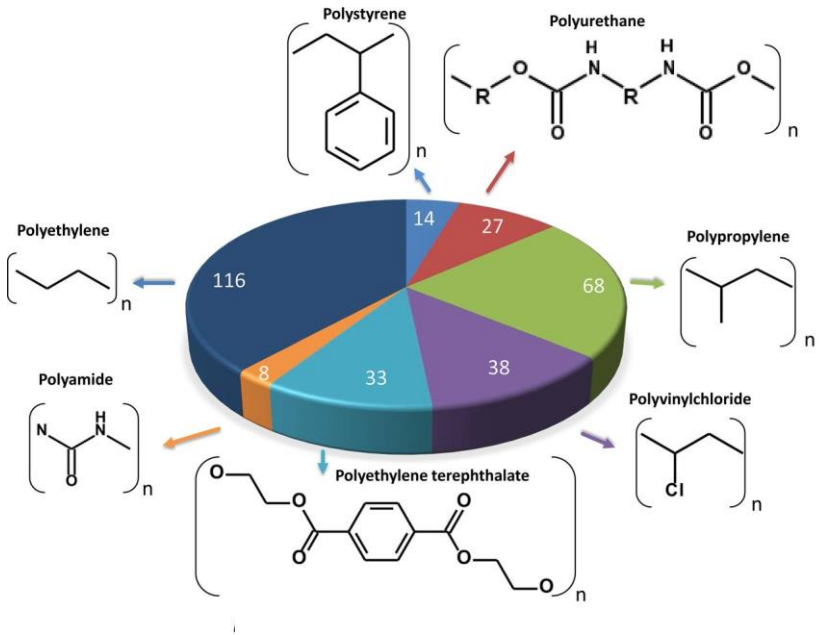
Programme

13:15 - 13:20 Welcome by Daniel Otzen, EnZync Center Director
13:20 - 13:30 Kristian Pedersen, Dean of the Faculty of Natural Sciences
13:30 - 13:40 Thomas Vosegaard, Director of iNANO
13:40 - 13:50 Torben Vedel Borchert, Scientific Director at the Novo Nordisk Foundation
13:50 - 14:05 Daniel Otzen: introduction to EnZync
14:05 - 14:20 Alexander Sandahl, DTI: Use and reuse of plastic
14:20 - 14:35 Peter Westh, DTU: Enzymatic plastic degradation
14:35 - 14:50 Maria Ramos, Porto University: Degrading plastic *in silico*
14:50 - 15:15 Associate Partner Dr. Ren Wei, University of Greifswald: Engineering enzymes to degrade plastic
15:15 - 17:00 Reception in the iNANO foyer

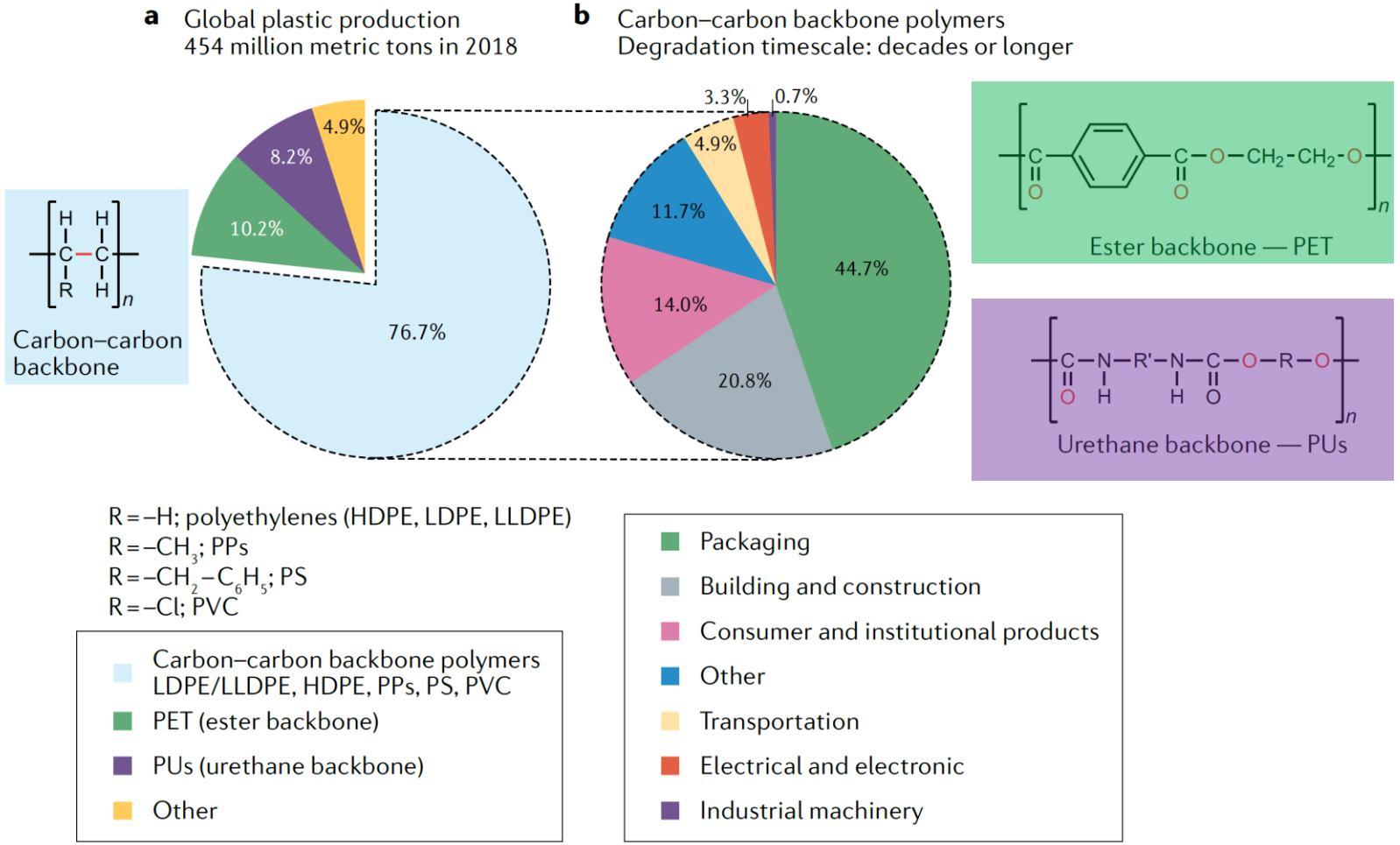
It’s all about breaking bonds

What is plastic?

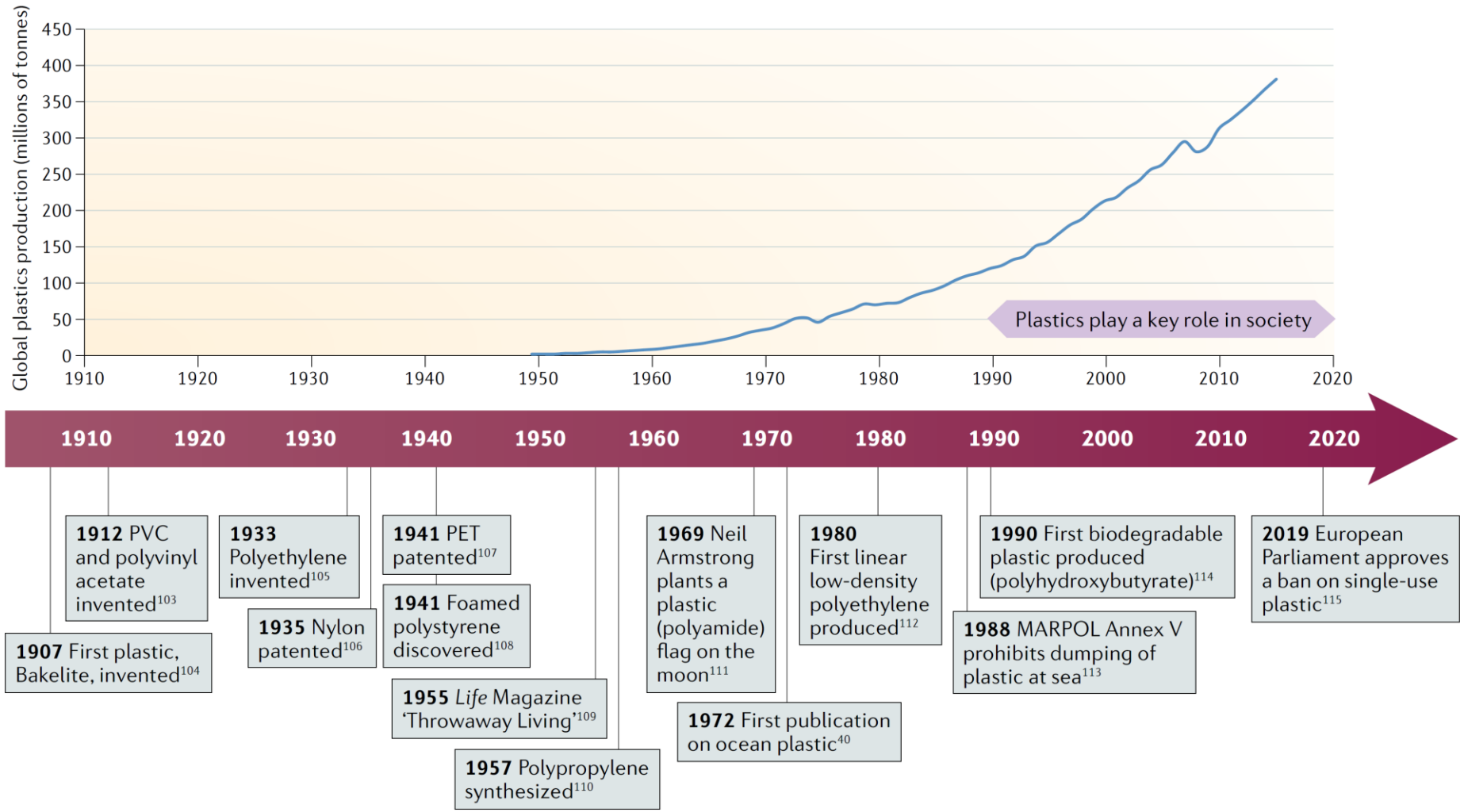
- 6-7 major types of plastic



- Only 1% from renewable resources
- By 2050, 50% of all oil will be used to make petrochemicals like plastic



The history and evolution of plastic



- 8300 million t since 1950s
- Found everywhere on the planet
  - Rivers
  - Deep ocean floors
  - Mountain tops
  - The poles
  - The air
  - Our food
- 2010: 32 million t (~9%) dumped in coastal regions
- 5-13 million t enter the ocean
- 15-51 x 10^{12} particles circulating in marine environment

The EnZync team



DTU: Enzymes and fungi

Peter Westh: enzyme reactions at interfaces (lignocellulose, plastics)
Uffe Mortensen: fungal microbiology (screening, genetics, production)
Preben Morth: protein crystallography at interfaces



AU: Protein-plastic structures

Daniel Otzen: protein biophysics, protein interactions with surfaces-polymers-amphiphiles, particle structure.
Andreas Møllebjerg: screening postdoc
Søren Thirup: protein xtals, synchrotron beamlines, protein-ligand complexes

Recruited!!

DTI: Polymer and substrate synthesis

Anders Sandahl: polymer synthesis
Allan Petersen, Martin Johansen, Andreas Sommerfeldt: organic and epoxy chemistry



Uporto: Computational analysis

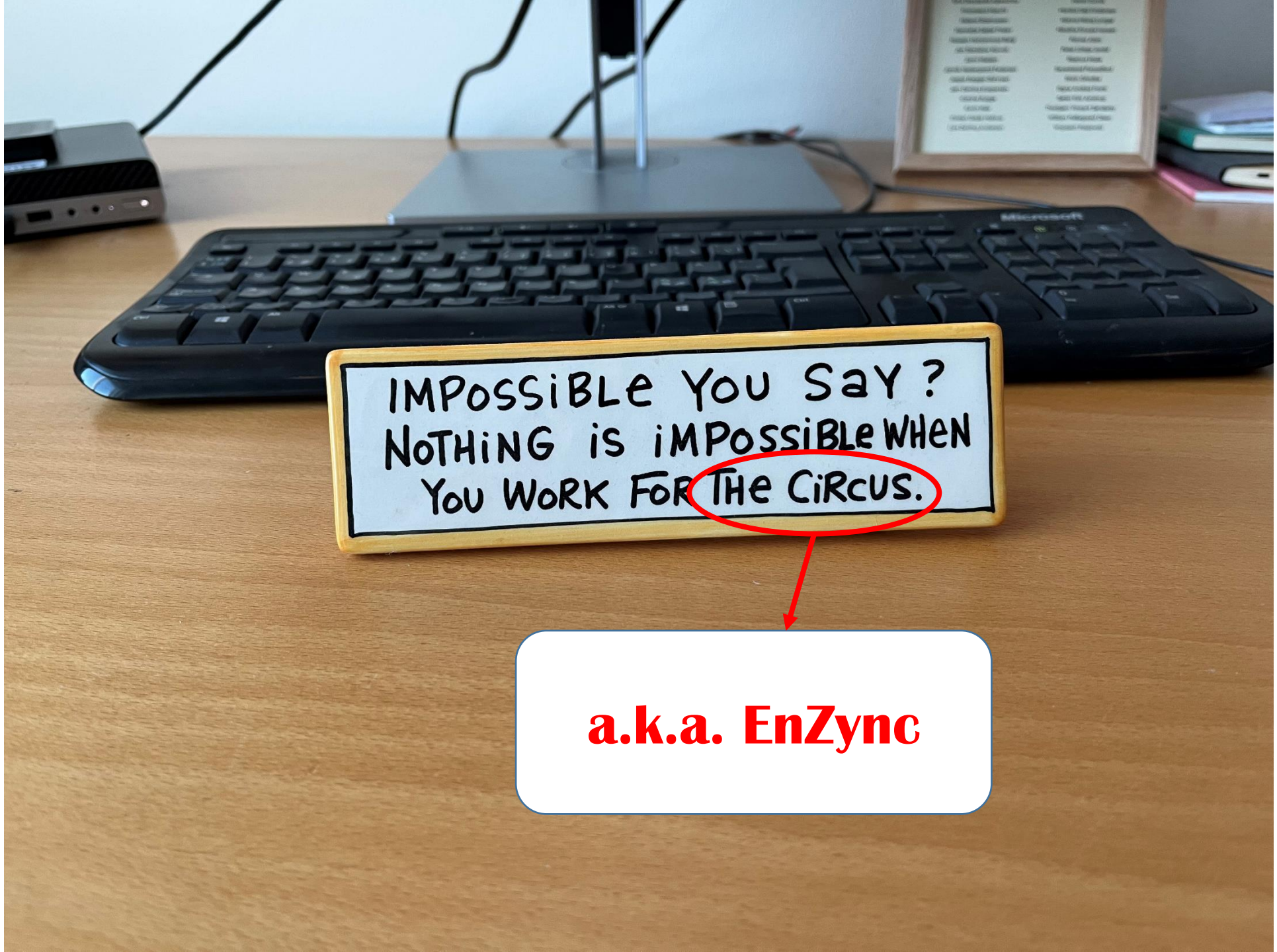
Maria Ramos: computational enzymology on plastics (QM/MM and MD)
Pedro Fernandes: computational enzyme reaction mechanisms, protein engineering
Pedro Paiva: computational postdoc

Recruited!!



How EnZync can make a difference

- **Impact**
  - Tangible industrial problem is translated into a scientific challenge that provides **foundational** insight into how enzymes work
- **Synergy**
  - We use computational science to fast-track experimental advances
  - We will harness chemistry to pretreat plastics and make enzymes better
- **Success criteria**
  - Identify enzymes degrading all 3 major thermoset plastics
  - Establish detailed structure-function relationships in all classes
- **Outreach**
  - We will promote information exchange with colleagues and companies
  - Include participants from academia and companies at annual meeting
  - DTI facilitates contacts to >100 plastic companies world-wide


IMPOSSIBLE YOU SAY?
NOTHING IS IMPOSSIBLE WHEN
YOU WORK FOR THE CIRCUS.
a.k.a. EnZync

Toward a Sustainable Plastic Culture

Daniel Otzen

Gauri Pathak

Transdisciplinary
Green Research
Collaborations

iNANO

EnZyne

SOLIDUM PETIT IN PROFUNDIS · UNIVERSITAS ARHUSIENSIS ·

School of Culture
& Society

Department of **Global Studies**

Transdisciplinary Interventions Across Lifecycle