From Plastic waste to Plastic value using *Pseudomonas putida* Synthetic Biology

P4SB project overview

EC-Workshop on maximising the impact of KET Biotechnology

Nick Wierckx

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The P4SB coordinators

Lars Blank – RWTH | iAMB

- Coordinator
- Official, scientific

Nick Wierckx – RWTH | iAMB

- Co-coordinator
- Scientific, practical

Christine Kempchen – RWTH | Div. 4.2

- Project manager
- Administration, organization, finance
# The Consortium

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<tr>
<th>Participant</th>
<th>Principal investigators</th>
<th>Country</th>
<th>Expertise</th>
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<tr>
<td>RWTH Aachen (coordinator)</td>
<td>Lars Blank, Nick Wierckx</td>
<td>DE</td>
<td>Metabolic engineering</td>
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<tr>
<td>University Leipzig</td>
<td>Wolfgang Zimmermann</td>
<td>DE</td>
<td>PET-hydrolysis</td>
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<tr>
<td>CSIC – National Centre for Biotechnology</td>
<td>Auxi Prieto, Juan Nogales</td>
<td>ES</td>
<td>PHA-biotechnology; Model-based design</td>
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<tr>
<td>University College Dublin</td>
<td>Kevin O’Connor</td>
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<td>Bioplastech</td>
<td>Shane Kenny</td>
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<td>BacMine</td>
<td>Pablo Pomposiello</td>
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<td>Helmholtz Centre for Environmental Research</td>
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<td>CNRS – University of Strasbourg</td>
<td>Luc Averous, Eric Pollet</td>
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<td>PU-hydrolysis</td>
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<td>Soprema</td>
<td>Rémi Perrin</td>
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<td>Plastic manufacturer</td>
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<td>Protéus</td>
<td>Cécile Persillon</td>
<td>FR</td>
<td>Enzyme technology</td>
</tr>
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The problem

Plastic waste!

- Best case:

- Worst case:
Plastic waste

8 million tons per year into the oceans!

source: USDA.gov
The P4SB objective

the biotransformation of non-sustainable plastic waste into sustainable value-added alternative materials

Bio-upcycling

Bioplastics
EU recycling targets

<table>
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<tr>
<th>Material</th>
<th>Now</th>
<th>EU 2020 Target</th>
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<tr>
<td>PET</td>
<td>&lt;30%</td>
<td>50%</td>
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<tr>
<td>PU</td>
<td>&lt;5%</td>
<td>70%</td>
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EU directive 2008/98/EC
The P4SB approach

- **WP1**: Plastic hydrolysis
- **WP2**: Monomer metabolism
- **WP3**: PHA production
- **WP4**: PHA secretion
- **WP5**: Synthetic Biology / Model-based design
- **WP6**: Dissemination / Exploitation
Maximizing impact

- Have a good business case
  - e.g. PU waste valorization
- Different, compatible commercial partners
  - Along the value chain

PU production
new products
new applications
increase efficiency

Enzyme engineering
patent licencing
technology development

Synthetic biology
patent licencing
new technologies
partnerships

PHA production
new substrates
new products
Increase efficiency
Thank you for your attention
Nick Wierckx
Co-coordinator P4SB

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www.P4SB.eu (coming soon)

Check out our new opinion paper:
Plastic waste as a novel substrate for Industrial Biotechnology.
Wierckx, N., M.A. Prieto, P. Pomposiello, V. de Lorenzo, K. O’Connor, and L.M. Blank