



Screening biocatalysts for the selective enzymatic separation of polyester blends



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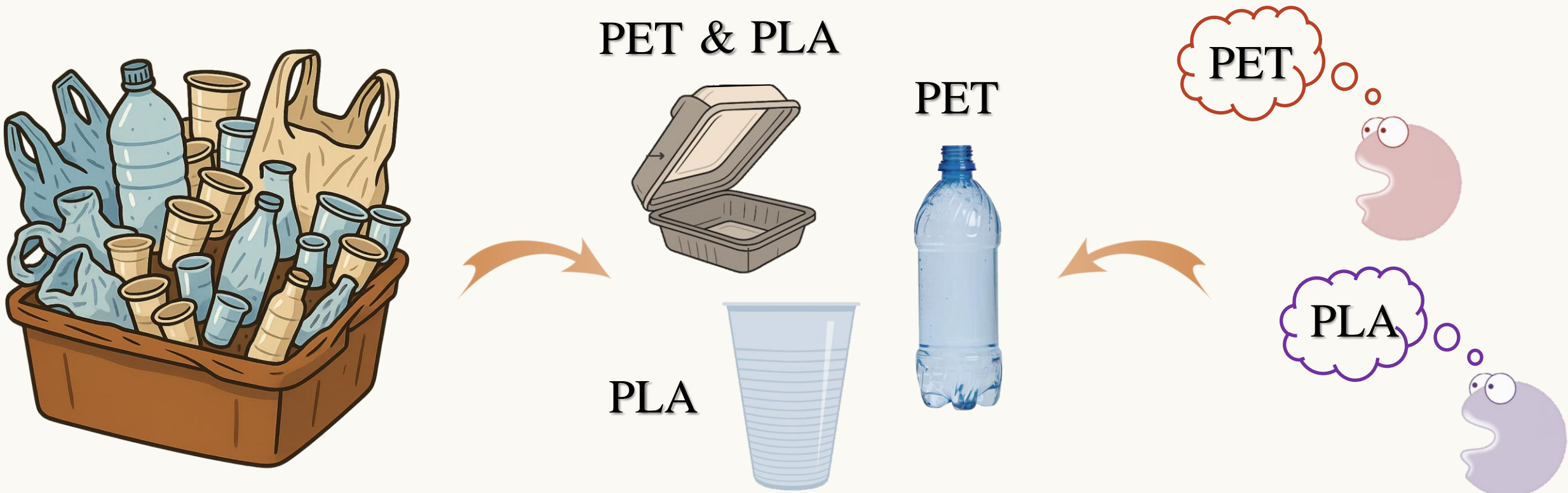
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The challenge of managing complex packaging waste streams

Packaging materials, mostly utilized in food-related applications, contribute significantly to pollution.

Mixed-polymer packaging poses a challenge for **mechanical recycling** due to its poor material properties.

Incineration and **chemical recycling** offer partial solutions, they conflict with circular economy goals or lack efficiency for similar-type polymer mixtures.



Enzymatic recycling offers a promising alternative, through selective breakdown of polymers like PLA and PET, addressing challenges associated with complex packaging waste streams.

Experimental procedure



17 serine hydrolases
(proteases & esterases)

In-house

Heterologous expression

(*P. pastoris* & *E.coli*)

Commercial

Dissolvment in optimal buffers



Plastics of aim

PLA

Semi-crystalline PLLA

PET

Semi-crystalline PET



Degradation evaluation

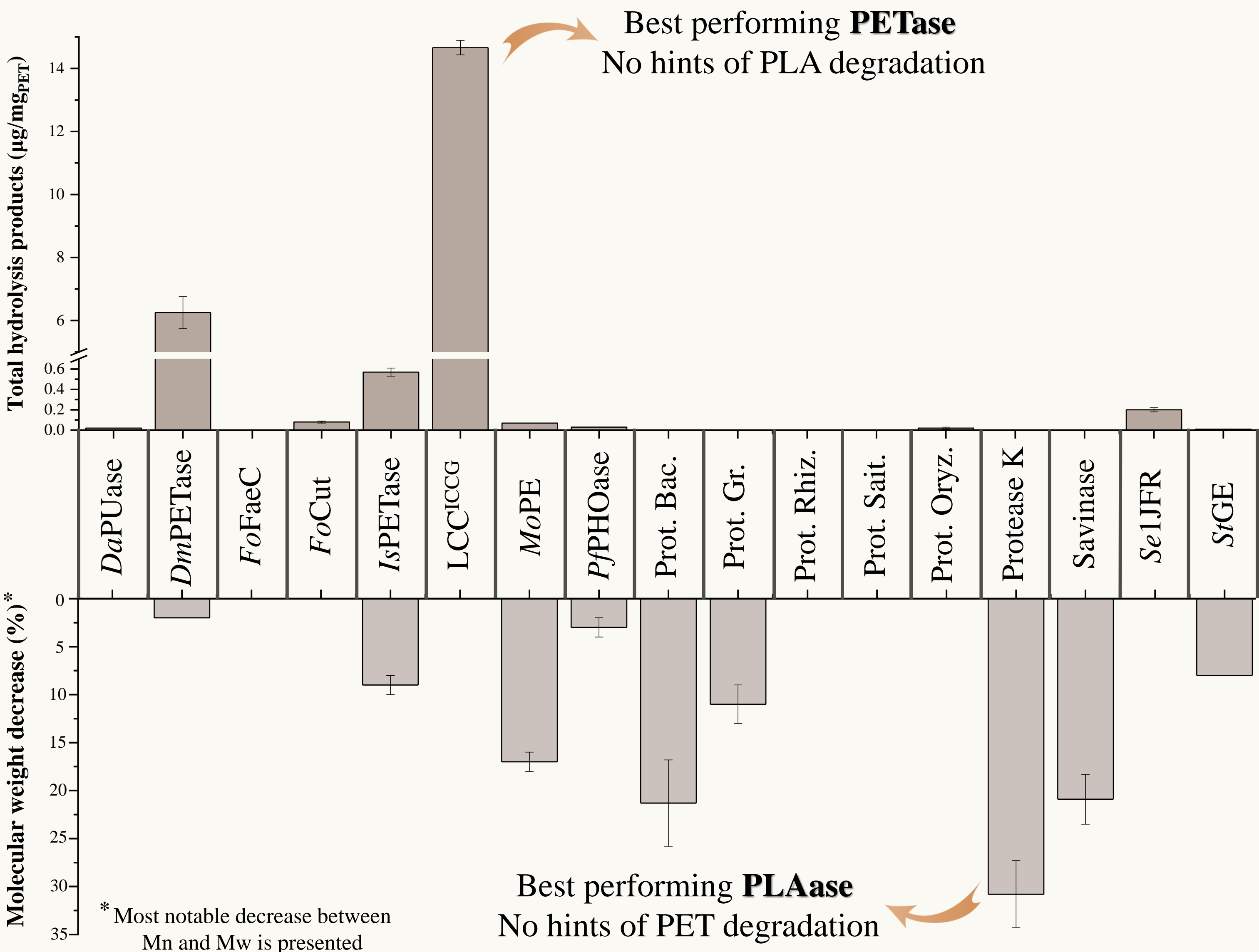
Molecular weight

alterations (PLA)
through GPC

Hydrolysis

products (PET)
through HPLC

Classification of investigated enzymes



Enzyme	Classification
<i>DaPUase</i>	PETase
<i>DmPETase</i>	Dual-function
<i>FoFaeC</i>	Inactive
<i>FoCut</i>	PETase
<i>IsPETase</i>	Dual-function
<i>LCC^{ICCG}</i>	PETase
<i>MoPE</i>	Dual-function
<i>PfPHOase</i>	PETase
<i>Prot. Bac.</i>	PLAase
<i>Prot. Gr.</i>	PLAase
<i>Prot. Rhiz.</i>	Inactive
<i>Prot. Sait.</i>	Inactive
<i>Prot. Oryz.</i>	PLAase
<i>Protease K</i>	PLAase
<i>Savinase</i>	PLAase
<i>Se1JFR</i>	Dual-function
<i>StGE</i>	Dual-function

Enzymes for selective degradation in polyester blends

Selective degradation of PET and PLA using **LCC^{ICCG}** and **Protease K** could purify packaging waste streams, facilitating efficient recycling and promoting sustainable waste management.

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