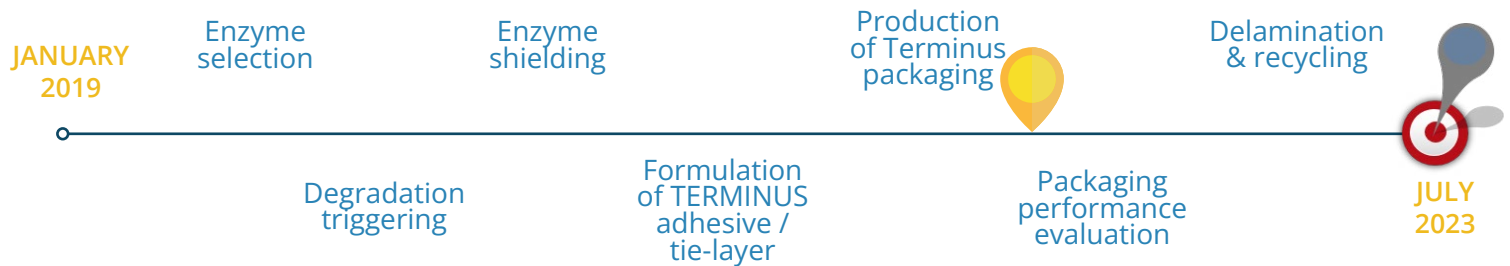


## in-built Triggered Enzymes to Recycle Multi-layers: an INnovation for USes in plastic packaging

### PROJECT TIMELINE & MILESTONES



We have entered the final period of our project and working diligently on delivering the remaining milestones. Throughout the remaining period, main efforts of the project will focus on processing of targetted packaging, proving its performance in use, as well as demonstrating the delamination process via which the layers will be retrieved and subsequently recycled.

These activities will be complemented with finalisation of LCA and LCC analyses, evaluations of the circularity benefits, strategy for integration of the technology and an economic performance assessment.

While we are nearing the end, exciting milestones still lay ahead of us and we, as a consortium, look forward to achieving them!

Vincent Verney, Project Coordinator

## TERMINUS SCIENTIFIC WORKSHOP

TERMINUS Scientific Workshop was organised within the scope of the VIII European Bioremediation Conference, on 14 June 2022.

The circularity of multi-material packaging must be increased if Europe is to reach the targets set within its legislative frameworks. Within the TERMINUS Scientific Workshop, the consortium addressed the research and activities that were undertaken with this goal in mind.



SCIENTIFIC WORKSHOP  
14 June 2022



The programme of the TERMINUS Scientific Workshop includes, among other topics:

- Enzymatic degradation of the most common aliphatic biopolyesters
- Complexity of multilayers, main challenges and solutions to reach the reality of sustainable industrial processes, an SME's point of view
- Nanobiocatalytic degradation of designer polyurethanes

The presentations shown during the Workshop can be found on the [TERMINUS website](#).



## COLLABORATIONS



### A Circular Multilayer Plastic Approach (CIMPA)

TERMINUS and CIMPA joined forces to improvements in the circularity of multilayer packaging.

CIMPA- A Circular Multilayer Plastic Approach for value retention of end-of-life multilayer films is an EU-funded, H2020 project, that will develop a recycling value chain for post-industrial and post-consumer multilayer films (from food and agricultural applications) to retain 12 up to 72% of their value yield based on a synergetic approach combining:

- innovative compositional sorting (combining Near InfraRed NIR- and digital watermarking sorting),
- mechanical and physical (dissolution) recycling,
- decontamination processes (advanced scCO<sub>2</sub>-based decontamination),
- upgrading (properties tuning) solutions.

8 September 2023

As part of the collaboration, TERMINUS took part in [CIMPA's Value Chain Workshop](#).

To strenghten the collaboration at a more indepth level, Vincent Verney was elected as part of CIMPA's Stakeholder Advisory Board.

### TERMINUS organises an informative session during CIMPA workshop

Alexandre Fontaine (STTP Emballage) and Rigoberto Ibarra Gomez (IPC) organised an informative session about TERMINUS on November 2, in Brussels.

During this workshop they shared information about the key objectives of the project & the approach taken to achieve so. The audience was informed about the progress & the next steps.



### TERMINUS PUBLICATIONS

The complete overview of TERMINUS publications can be found on our [website](#) and the [TERMINUS Zenodo Community](#).

AUTHORS	PUBLICATION TITLE
Mačiulytė, Sandra; Strakšys, Antanas; Asadauskas, Svajus Joseph	Influence of Aliphatic Moieties in Diisocyanates on Chain Extension Kinetics of Adipate Macrodiols
Asadauskas, Svajus Joseph; Mačiulytė, Sandra; Strakšys, Antanas; Bėkiš, Julija	Chain extension of caprolactone and ethylene glycol macrodiols into hydroxyl-terminated polyurethanes
Asadauskas, Svajus Joseph; Bražinskienė, Dalia; Grigucevičienė, Asta	Short-term and long-term volatilities of films from polyol ester and ether-based oils of various molecular weights
Asadauskas, Svajus Joseph; Mačiulytė, Sandra; Bražinskienė, Dalia; Matijošius, Tadas; Nemaniute, Paulina	Influence of ester diluents and chain extension on polyurethane viscosities
Rosato Antonella; Totaro Grazia; Celli Annamaria; Raddadi Noura; Zanaroli Giulio; Sisti Laura	New strategy for Multilayers packaging recycling
Romano Angela; Rosato Antonella; Totaro Grazia; Celli Annamaria; Zanaroli Giulio; Sisti Laura	Enzymatic degradation of a commercial bio-based polyester and evaluation of the mechanism involved
Romano, Angela; Rosato, Antonella; Totaro, Grazia; Zanaroli, Giulio; Celli, Annamaria; Sisti, Laura	Efficient enzymatic degradation of poly( $\epsilon$ -caprolactone) by a commercial lipase
Romano, Angela; Rosato, Antonella; Totaro, Grazia; Celli, Annamaria; Sisti, Laura; Zanaroli, Giulio	Studio del meccanismo di degradazione enzimatica di poliesteri commerciali
Totaro, Grazia; Rosato, Antonella; Romano, Angela; Zanaroli, Giulio; Celli, Annamaria; Sisti, Laura	Enzymatic degradation of polyesters
Gytautė Sirgėdaitė; Paulina Nemaniutė; Dalia Bražinskienė; Svajus Joseph Asadauskas	Influence of Layered Double Hydroxides on Polyaddition of Aromatic Isocyanate and Macrodiol
Paulina Nemaniutė; Marijus Jurkūnas; Dalia Bražinskienė; Svajus Joseph Asadauskas	Viscosity Variation During Addition of Polyglycols to Tri-functional Isocyanate

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AUTHORS	PUBLICATION TITLE
Paulina Nemaniutė; Marijus Jurkūnas; Dalia Bražinskienė; Svajus Joseph Asadauskas	Viscosity Variation During Addition of Ester and Ether Macrodiols to Isocyanates
Audré Kalinauskaitė; Dalia Bražinskienė; Svajus Joseph Asadauskas	Tendencies of Solid Phase Formation in Deep Eutectic Solvents of Betaine and Xylitol
Dalia Bražinskienė; Audré Kalinauskaitė; Svajus Joseph Asadauskas	Bio-derived feedstocks for natural deep eutectic solvents
Simona Varriale; Astrid E. Delorme; Jean-Michel Andanson; Julien Devemy; Patrice Malfreyt; Vincent Verney; Cinzia Pezzella	Enhancing the Thermostability of Engineered Laccases in Aqueous Betaine-Based Natural Deep Eutectic Solvents
Mačiulytė, Sandra; Nemaniutė, Paulina; Bražinskienė, Dalia; Eicher-Lorka, Olegas; Asadauskas, Svajus Joseph;	Additive effects on curing ester-based degradable polyurethane adhesives
Nemaniutė, Paulina; Jurkūnas, Marijus; Bražinskienė, Dalia; Asadauskas, Svajus	Viscosity Variation During Addition of Ester and Ether Macrodiols to Isocyanates
Kalinauskaite, Audré; Bražinskienė, Dalia; Asadauskas, Svajus Joseph	Bio-derived feedstocks for Natural Deep Eutectic Solvents
Kalinauskaitė, Audré; Bražinskienė, Dalia; Asadauskas, Svajus	Tendencies of Solid Phase Formation in Deep Eutectic Solvents of Betaine and Xylitol
Nemaniutė, Paulina; Matijošius, Tadas; Bražinskienė, Dalia; Asadauskas, Svajus Joseph;	Effects of isocyanate addition on viscosity of ester-based polyurethanes
Simona Varriale; Astrid E. Delorme; Jean-Michel Andanson; Julien Devemy; Patrice Malfreyt; Vincent Verney; Cinzia Pezzella;	The power of NADES: Boosting enzyme stability towards thermal degradation
Simona Varriale; Astrid E. Delorme; Jean-Michel Andanson; Vincent Verney; Cinzia Pezzella;	Enhancement of laccases thermostability in Betaine based Natural Deep Eutectic Solvents

## EVENTS



### Innovation Forum 4 Plastics

13-14 October 2023

TERMINUS presented at the Innovation Forum 4 Plastics, during which the Plastics Circularity Multiplier initiative was revived.

The aim of the initiative is to promote synergies among EU funded projects & thereby accelerate the transition toward a circular plastic economy.



### All4Pack Emballage Paris

21-24 November 2023

Representatives of the TERMINUS consortium attended this year's All4Pack expo which gathered more than 66,000 professionals.



## WHAT IS TERMINUS?

Multilayer packaging comes in many sizes and forms. While each layer serves an important role to protect the product, we need to ensure they are recycled.

This is where TERMINUS comes in!



TERMINUS website provides general information about the project, as well as the latest news and updates on project results.

[www.terminus-h2020.eu](http://www.terminus-h2020.eu)

More updates can be found on our social media accounts.

 @H2020TERMINUS

 TERMINUS Project