

ECCS
2025
Conference

The 3rd International Electronic Conference on Catalysis Sciences

23–25 April 2025 | Online

Program and Abstract Book

sciforum-112101: Comparing the secretome response of *Aspergillus* and *Fusarium* species on chemically treated plastics

Markella Papi ^{1*}, George Taxeidis ¹, Christina Gkountela ², Stamatina Vouyiouka ², Efstratios Nikolaivits ¹ and Evangelos Topakas ¹

¹ Biotechnology Laboratory, School of Chemical Engineering, National Technical University of Athens, 5 Iroon Polytechniou Str., Zografou Campus, Athens, 15772, Greece

² Laboratory of Polymer Technology, School of Chemical Engineering, National Technical University of Athens, 5 Iroon Polytechniou Str., Zografou Campus, Athens, 15772, Greece

Nowadays, plastic pollution represents one of the most pressing environmental challenges, with millions of tons of synthetic polymers accumulating worldwide in landfills as well as in water bodies. Polyethylene terephthalate (PET), widely used in packaging and textiles, is resistant to natural degradation, while polylactic acid (PLA), although considered biodegradable, requires specific industrial conditions. Biological approaches, particularly those utilizing fungal strains, offer a sustainable alternative for addressing plastic waste. In this study, thirteen fungal strains were screened for their ability to grow on solid media containing chemically treated PET or PLA as the sole carbon source. The two most promising strains, *Fusarium oxysporum* BPOP18 and *Aspergillus parasiticus* MM36, demonstrated significant growth and polymer clearance halos on both PET and PLA solid media. However, enzymatic assays in liquid cultures revealed notable protease and esterase activity only in the presence of PLA, while in the presence of PET, the fungi showed no detectable enzymatic activity. To further investigate the enzymatic mechanisms underlying PLA degradation, proteomic analysis was conducted on the secretome of both fungi from PLA cultures. This revealed the presence of key proteins potentially involved in PLA breakdown, providing insights into enzymatic pathways and supporting the development of fungal-based biotechnological solutions for plastic waste management.



© 2025 by the author(s). Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).