

**Title:** A solution for plastic waste pollution – SOLFORPLAS

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## Abstract:

*Note: maximum length of 400 words.*

## Topic

Recycling and sustainable polymers and processes

Since the 1970s, the mismanagement of plastic waste has been increasingly threatening our health and environment<sup>1</sup>. Rather than been reduced, plastic production is growing exponentially. By 2050, the estimation of plastic waste in landfills or in the natural environment verges on 12 billion metric tons if current production and waste management trends continue<sup>2</sup>. Societies are raising awareness about this concern, although our dependency makes nearly impossible to imagine a world without plastics. This urges for a solution making plastic production and degradation sustainable. To date, important efforts have been made to isolate and identify unique microorganisms capable of utilizing plastics as a carbon source. Although there is empirical evidence of it, the rates of biodegradation are still very low<sup>3,4</sup>.

In our EU-funded project SOLFORPLAS (A solution for plastic waste pollution), we apply cutting-edge biology tools, including fermentation and analytical processes, together with state-of-the-art methods in industrial microbiology research, to investigate plastic biodegradation using a highly optimized strategy that combines an extruder and a bioreactor. To do so, we integrate physical, chemical, and biological treatment mimicking the biodegradation process in worms. By applying these approaches, we have characterized the process in vitro, first separately, then as a whole process, revealing our best conditions for polymer biodegradation. Multiple polymer characteristics have been monitored to determine/quantify its biodegradation (FTIR, GPC and SEM). This pioneering in vitro study establishes the guidelines for successful scale up in BioDegradator, coupling extrusion and fermentation processes.

Our dataset can contribute to solving one of the biggest environmental problems that humans are facing in this century, with direct applications in the industries of plastic recycling and single-cell protein production.

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