29.07.2025

Abstract

Innovative Solvent-Based Recycling Process: Advancing Towards Industrial Scale and Circular Economy

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The department for polymer recycling at Fraunhofer IVV has been developing a solvent -based recycling process for various polymers for over 20 years. In this dissolution process the polymer chains remain intact, in contrast to chemical recycling, in which the macromolecules are decomposed. This results in significantly lower energy consumption and enables the recovery of high-purity plastic fractions such as PE, PP, PS, PET, PA, PVC, ABS and other materials.

The process can be used universally and processes a wide variety of waste streams: WEEE and ELV waste, packaging, composites, construction and demolition waste and textiles. The team is currently aiming to upscale the process to an industrial scale. After establishing the technology on a small technical scale with 100-liter reactors, the department successfully commissioned an industrial demonstration plant on a 500-liter scale in Freising two years ago. The Fraunhofer IVV has also realized pilot plants with partners in joint projects in Germany, the Netherlands and Indonesia. Both internal and external upscaling experience is currently being incorporated into the planning of an industrial plant for PE packaging recycling in Canada by 2027.

The presentation will highlight three areas of application that have been successfully implemented on an industrial scale and are of particular focus for our upscaling: the processing of polyamide composites from the automotive industry, the recovery of PVC from construction waste and the recycling of food packaging. These examples illustrate not only the versatility of the process, but also its potential to contribute to the circular economy and resource conservation in various industries.