Fraunhofer IZFP

SENSOR AND DATA SYSTEMS FOR SAFETY, SUSTAINABILITY, AND EFFICIENCY

PRESS RELEASE

Fraunhofer IZFP presents an intelligent thermography demonstrator for sorting black plastics at SOLIDS & RECYCLING-TECHNIK 2026

Efficient and single-variety recycling of black plastics

At the trade fair duo for the bulk solids, process, and recycling industries, the Fraunhofer Institute for Nondestructive Testing IZFP from Saarbrücken will be exhibiting a demonstrator that, for the first time, characterizes and sorts black plastics by type using active thermography and machine learning. This addresses a key problem in the circular economy: black plastics, which have largely been sent to thermal treatment because suitable sorting technologies were unavailable or too expensive, can in the future be kept in the materials loop as valuable recyclable materials. Experts from Fraunhofer IZFP will present the sorting demonstrator from March 18 to 19, 2026, at SOLIDS & RECYCLING-TECHNIK in Dortmund (Dortmund Exhibition Center, Hall 4, Booth D47).

While transparent plastic packaging and colorful cups can be easily recognized and automatically sorted, black plastic parts often remain "invisible" to sorting machines – and consequently end up in thermal recycling. Fraunhofer IZFP is addressing this very problem, because instead of short- or medium-wave hyperspectral cameras, the research team is using a thermography-based approach: The method is more cost-effective than medium-wave hyperspectral infrared systems and able to detect the thermal material differences between various types of black plastic – something that commercially available near-infrared systems cannot do due to physical limitations. The Fraunhofer IZFP researchers have already made significant progress with the precise differentiation between polyamide (PA) and polypropylene (PP).

Chief Communication Manager / Editorial Notes:
Sabine Poitevin-Burbes | Fraunhofer Institute for Nondestructive Testing IZFP | Phone +49 681 9302-3869 | Campus E3 1 | 66123 Saarbrücken, Germany | www.izfp.fraunhofer.de | sabine.poitevin-burbes@izfp.fraunhofer.de

Scientific Contact:
Andreas Keller, M. Sc. | Fraunhofer Institute for Nondestructive Testing IZFP | Phone +49 681 9302-3967 | Campus E3 1 | 66123 Saarbrücken, Germany | www.izfp.fraunhofer.de | andreas.keller@izfp.fraunhofer.de

Kevin Schmitz, M. Sc. | Fraunhofer Institute for Nondestructive Testing IZFP | Phone +49 681 9302-3832 | Campus E3 1 | 66123 Saarbrücken, Germany | www.izfp.fraunhofer.de | kevin.schmitz@izfp.fraunhofer.de

Live at the trade fair: AI-supported demonstrator shows single-variety separation of black plastics

The intelligent demonstrator illustrates a complete, practical sorting scenario to visitors of the trade fair duo: Black plastic samples move on a conveyor belt under an infrared radiant heater, where they are slightly heated and then measured by a thermal imaging camera. The thermal "signatures" generated are analyzed in real time by an AI model, which immediately makes a corresponding sorting decision. A sorting arm at the end of the belt then directs the materials to the left or right depending on the type detected.
"Our demonstrator clearly shows how we can enable cost-effective sorting of black plastics using active thermography and artificial intelligence. This creates an important basis to close the loop for these challenging materials as well. In doing so, we can save valuable resources and reduce CO_2 emissions at the same time," explain Andreas Keller and Kevin Schmitz, the scientists responsible for the project at Fraunhofer IZFP.

Black plastics sorted efficiently: Fraunhofer IZFP presents AI-supported thermography sorting demonstrator at SOLIDS & RECYCLING-TECHNIK 2026 in Dortmund.
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Prospects for industrial application

This development is highly significant since sorting black plastics on an industrial scale allows for a recovery of valuable raw materials and saves considerable amounts of CO_2. This could benefit many industries that use large quantities of black plastics, such as the lightweight packaging industry, the automotive sector, the electronics industry, and the sporting goods industry.
As a next step, the researchers plan to extend the process to other types of plastics, increase the sorting speed, explore alternative excitation methods, and optimize the overall system. The goal of the Saarbrücken research team is to make the research results usable for industrial applications.