Are you already familiar with our industry-standard services?

- Accredited testing laboratory in accordance with DIN EN ISO/IEC 17025 for various NDT methods
- Certificate of competence of the accredited laboratory to qualify and validate (new) nondestructive testing methods for industrial testing practice in the field of ultrasonic testing
- Rapid transfer to market readiness for qualified, standard-compliant use in industrial applications, both for new developments (in-house developments) or for adaptations
- Our associated quality management system is certified in accordance with DIN EN ISO 9001

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Fraunhofer IZFP

Sensor and Data Systems for Safety, Sustainability and Efficiency

Efficiently sorting black plastics by type

ThermoSort

Black plastics are commonly found in the lightweight fraction of shredded material. The goal is to recover the valuable polyamide 6 from this material stream.

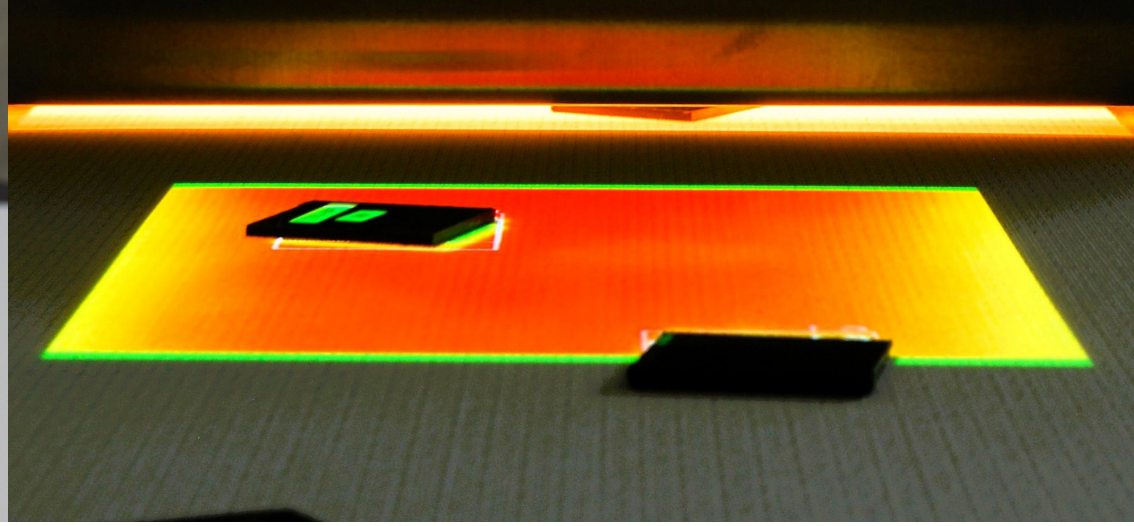
Thermography-based method for the efficient sorting of black plastics

Large quantities of black plastic waste are generated every year. However, while light-colored or colored plastics can already be sorted and recycled automatically today, black plastics continue to pose major challenges for the recycling industry. Conventional sorting systems fail to reliably detect these materials, so they end up in thermal recovery. This results in the loss of valuable raw materials and avoidable CO_2 emissions.

Fraunhofer IZFP has developed an innovative solution to efficiently recover black plastics in a pure, sorted state for the material cycle in the future: With the AI-supported sorting demonstrator "ThermoSort", black plastics can for the first time be reliably characterized via thermography and separated by type. The innovative process combines active thermography with machine learning and opens up new possibilities for a sustainable circular economy.

Unlike conventional near-infrared systems, this method detects thermal differences in black plastics—differences that have not previously been used as a sorting criterion in this context. This technology already makes it possible to precisely distinguish between polyamide (PA) and polypropylene (PP).

On a conveyor belt, black plastic parts are briefly heated under an infrared heater. A thermal imaging camera then captures the resulting thermal signatures. An AI model analyzes this data in real time and identifies the respective type of plastic. The automatic sorting unit then separates the materials by type.



The samples heated by the infrared heater are tracked by a thermal imaging camera, and their cooling curves are recorded.

Your benefits

- Sorting of black plastics by type
- Higher recycling rates and recovery of valuable raw materials
- Reduction of CO_2 emissions through decreased thermal disposal
- More cost-effective alternative to mid-wave hyperspectral infrared systems
- Real-time analysis and automated sorting decisions
- Potential for industrial use in existing recycling processes

Areas of application

This technology is suitable for any situation where black plastic waste needs to be sorted by type and returned to the material cycle:

- Recycling and waste management
- Light packaging industry
- Automotive industry
- Electronics industry
- Sports and leisure goods manufacturers
- Plastics processing industry

Prospects for the industry

This technology lays the groundwork for keeping black plastics in the recycling loop as a valuable resource in the future, rather than using them for energy recovery. This will help conserve raw materials, improve recycling processes, and support climate protection goals.

Fraunhofer IZFP is already working on expanding the technology to include additional types of plastics, increasing sorting speeds, and optimizing the overall system for industrial use.