

SEPARATION AND SORTING TECHNOLOGIES

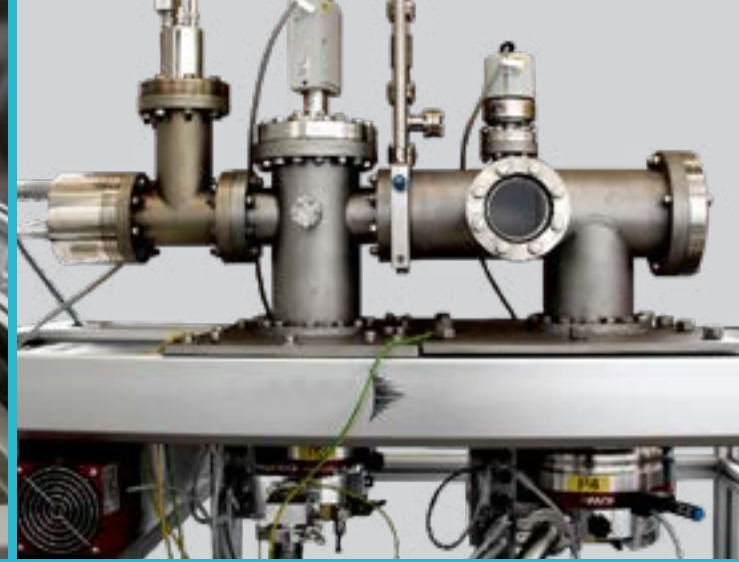


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The scarcity of resources has become a central topic for the economic and social development of industrial countries. The sustainable supply of raw materials is essential for the industry and is becoming increasingly important, especially concerning certain rare elements, which are necessary for many technological products such as smartphones.

Research and development of new recycling technologies for these materials will be a main task for the future of industrial societies. Currently, only a few efficient recycling methods exist for the separation or recovery of critical elements in low concentrations, e. g. in electronic devices.

Overview

The most important topic for “closing the loop” is the pre-treatment of the material and the subsequent separation of critical elements.

The department “Separation and Sorting Technologies” develops new technologies for the recycling and recovery of critical materials. We offer a wide range of different kinds of technologies which are developed and adjusted to the customer’s requirements.

In addition, chemical extraction and precipitation as well as bioleaching can be applied.

Mechanical comminution

We offer a variety of crushing and shredding technologies on laboratory and pilot scale. The material can be disintegrated and homogenised depending on the customer’s requirements. The technologies are applicable for different materials. Soft, fibrous, hard and brittle samples in dry or wet condition can be processed. The analyses of particle size, particle shape, and density can also be conducted.

The following equipment is available

- Impact crusher
- Jaw crusher
- Speed rotor mill
- Cutting mill with cyclone separator
- Planetary ball mill
- Mixer mill
- Cryogenic mill
- Sieve tower
- Wet separation table
- Optical particle size analysis

Electrohydraulic fragmentation (EHF)

The electrohydraulic fragmentation (EHF) is based on shock waves which are generated by pulsed high voltage spark discharges. The shock waves propagate through the surrounding carrier medium and hit the material. The short but very intense mechanical impacts preferably attack weak spots within the material: The fragmentation occurs at macroscopic joinings (clamped, bonded or screwed) or microscopic phase or grain boundaries. The specific weakening of interfaces

within the material enables a selective separation that is largely independent of the degree of comminution. As a result, there is a high liberation of materials without excessive comminution.

Our project group operates an EHF pilot plant. We offer experiments with your material and help to optimise the process parameters to obtain a selective fragmentation of the components. The results will be evaluated in detail and the input and output material will be physically and chemically analysed. Depending on the customer’s request an economic assessment of the application will be carried out. Additionally, we offer an upscaling of the process.

Classification and sorting

Various physical and sensor-based equipment is available for the classification and sorting of granular material in the optimum size range of 1-50 mm:

- Multi-deck screening machine (flip-flow screen)
- Magnetic drum separator (Nd-Fe-B)
- Eddy current separator (eccentric rotor)
- Multi-sensor system (induction sensor, optical CCD camera, NIR hyperspectral camera)

With these technologies metals, plastics and minerals but also biological materials can be selectively separated from material flows. The individual machines can be either operated separately or linked together into specific process chains. The digital recording of all relevant operating data allows for a detailed process analysis and the optimisation of operating parameters. Throughputs of maximum 2.5 t/h

can be reached depending on the input material and the specific task. However, fundamental investigations regarding the sorting capability can also be performed with much smaller amounts of input material.

Separation of raw materials via gas phase reactions

Solid-gas reactions offer the possibility of transferring selectively certain valuable metals into gaseous compounds and thereby separate them. Thus, the recycled material reacts with a suitable gaseous reagent. Such reactions can be interesting for the recovery of certain metals, for example from mineral raw materials, concentrates, electronic scrap as well as for the separation of pollutants.

Based on so-called “Chemical Transport Reactions” new technologies for the recovery of valuable materials are developed. The reaction conditions are adjusted for the specific material of the customer. They can be calculated previously with the help of thermodynamic data and have to be optimised only insignificantly on a laboratory scale. Thus, preliminary experiments are spared and a quick industrial scale implementation is possible.

Are you interested in a cooperation?

If we have aroused your interest, contact us by phone or mail. We will be pleased to advise you. For more information, please visit our website.