



High-tech company establishes itself in the recycling industry

The shockwave fragmentation technology is not only a more environmentally friendly way to recycle electronic scrap; it also improves the recovery of raw materials, which can then be fed back into the materials cycle. It is a technology with the potential to be used for a wide range of applications, as proven by ImpulsTec GmbH.

Lithium-ion battery cells, electroplated plastics, and rare earths are all elements that are difficult to recycle. But high-tech company ImpulsTec GmbH, based in Radebeul, near Dresden, has found a solution. With its high-voltage impulse technology, ImpulsTec has achieved the global economy's goal of using a recycling technology that fragments composites into their individual components to separate the raw materials and feed as many of these as possible back into the materials cycle. Lithium-ion batteries, for example, have effectively ended up becoming sustainable, with the Radebeul-based company successfully using a continuously operating shockwave system to recycle old batteries from electric cars, thereby rendering the valuable raw materials usable again. ImpulsTec GmbH's shockwave or even electro-hydraulic fragmentation process enables battery materials to be recovered and processed in a cost-effective, energy-efficient manner, ensuring the (long-term) availability of high-tech resources in Germany and improving both the environmental balance sheet and our future.

The process

ImpulsTec GmbH's innovative fragmentation process uses mechanical shockwaves generated in a liquid medium to fragment the material. The shockwaves are produced with the aid of the electro-hydraulic effect by sparking a brief arc in a liquid between two electrodes. To do this, capacitors are charged to the required operating voltage of up to 50 kV, and then connected to the fragmentation reactor's electrode system via a spark gap. The resulting "avalanche" generates a rapidly expanding plasma channel that generates radiating shockwaves in the liquid. Pressures equivalent to several thousand atmospheres arise near the point of origin. Once spread within the reactor, these shockwaves hit the material in the liquid, and fragment it. The electro-hydraulic fragmentation process connects with the material through the shockwave radiating within the fragmentation medium. No contact is made with a solid fragment here, making the separation process "contactless."

The highly selective nature of the ImpulsTec GmbH industry-standard shockwave process when it comes to materials means it exhibits increased fracture behavior at the interface of various materials, making it ideal for use on complex industrial materials and composites.



Applications

The shockwave process facilitates high-quality recycling of electronic scrap. Electronic devices are gently opened up at mechanical weak spots, and selectively fragmented into their individual components. Selectively fragmenting complex modules improves the probability of being able to recycle the individual material fragments, such as the separated components, PCBs, structural elements, or components containing precious metals.

It is an ideal method for treatment processes involving strict purity requirements, because, unlike conventional methods, it enables high-purity (semiconductor) materials to be fragmented in a non-contact manner.

One promising area of application is the recycling of composites, such as photovoltaic modules or electro-plated plastics. By fragmenting materials into their individual components, the material-selective fragmentation process will be able to unlock more efficient options for usage and recycling in future—a shift away from pure material-based recycling to functional recycling, where the materials are directly reused in production processes.

The shockwave method can also be used to gently fragment modules containing hazardous substances, in order to then facilitate further processing both of components containing hazardous substances, and components that do not.

The company

The innovative shockwave fragmentation process enables scrap from industrial materials to be mechanically exposed and reinforced for more efficient recycling—a technology with the potential to be used in a wide range of applications. The main focus of high-tech company ImpulsTec is on developing and building shockwave fragmentation systems for various purposes. The Radebeul-based company's services also include project planning for entire, customer-specific systems, and conducting studies and test campaigns.



Cell phone after usage of the shockwave process

About ImpulsTec

ImpulsTec GmbH (a member of the HOCH.REIN Group) was established as a spin-off from the research department of a photovoltaic group in 2014 to keep further developing the versatile, high-potential shockwave technology, and ultimately launch it on the market. The company's main focus is on developing and building shockwave fragmentation systems for various purposes. The innovative strength and technological expertise of the young, Radebeul-based high-tech company is reflected in its patents, which also make it a market leader in the field of shockwave fragmentation.

For more information, visit www.impulstec.com

About HOCH.REIN

The HOCH.REIN Group is an international, medium-sized holding company aimed at promoting entrepreneurship. The Local Family Office in Germany's Lower Franconia region operates in the areas of technology, energy, megatrends, and innovations. It supplies its strategic partners with technical know-how, and provides financial support to innovative businesses. HOCH.REIN works with its partners to develop new, creative ideas that lead to innovative technical solutions. Successfully launching innovative products and/or processes requires a number of development stages that rely on various resources. Through its partnerships and its internal Shared Services Center, HOCH.REIN facilitates lasting flexibility and strength for these individual links along the value chain. For more information, visit www.hoch-rein.com.



impulstec

MODERN ENVIRONMENTAL ENGINEERING & THE RECYCLING INDUSTRY

Media contact: Irina Gerlach, PR & Marketing, phone: +49 (0) 9321 2681610, irina.gerlach@hoch-rein.com

Publisher: HOCH.REIN GmbH, Steigweg 24, 97318 Kitzingen, www.hoch-rein.com