



High-tech Company Achieves Breakthrough in Battery Recycling

The ImpulsTec GmbH shockwave process enables almost all components of lithium-ion batteries to be recovered. The recycled raw materials and functional materials can then be fed back into the production process to create new batteries all thanks to a continuous shockwave system. The first of these systems has already been sold, and the construction of further systems is also underway.

How are electric-vehicle batteries recycled? How are rechargeable batteries and potentially hazardous substances disposed of? Every second person finds themselves asking these and other questions, because battery-powered electric vehicles have been coming under fire—not just for their often unsatisfactory range, but particularly also for their apparently dubious environmental balance sheet. Their batteries contain a number of important and rare raw materials, most of which cannot be directly re-used once they reach the end of their life cycle. This is due to the variety of materials and the complex structure of the batteries, which cannot be broken down on a material-specific basis using conventional recycling methods, and thus cannot be recovered in a high enough quality to be fed back into the production process. As such, it is generally only by recycling material compounds using the pyro/hydrometallurgical process that valuable elements can be recovered.

If e-mobility develops as planned by most manufacturers, the issue of battery-recycling will have to be addressed at an industrial scale. Radebeul-based company ImpulsTec is making a move here, having successfully used a continuous shockwave system to recycle worn-out electric-vehicle batteries and render the precious raw materials usable again.

Shockwave technology for environmentally friendly, socially responsible recycling of electronic scrap

The innovative shockwave fragmentation process enables scrap from industrial materials to be mechanically exposed and reinforced for more efficient recycling.

The previously discharged battery cells are sent, via conventional conveyor technology, into a fragmentation tank filled with an aqueous medium. This is where the material is actually treated. At least four parallel high-voltage electrodes are used to generate a cycle of shockwaves in the fragmentation tank. These intensive pressure surges hit the battery cells, causing the cell's casing to open. The advantages of this process include the fact that the medium in which the treatment occurs is a liquid (as this passivates the electrolyte that subsequently leaks out), that there is no fire risk, and that no hazardous, cobalt-containing dust particles can be produced. Further shockwave treatment can fragment the opened battery cells into cathode and anode material, and selectively de-coat them. This simultaneously enables the valuable cathode coating (usually a cobalt-containing mixed-metal oxide) to be very easily separated from the anode coating (usually graphite) using the smart shockwave treatment,



resulting in economic benefits when the concentrates are recycled. The fragmented battery materials are transported out of the fragmentation tank and separated using conventional conveyor and sorting equipment.

The shockwave process is particularly used for cobalt-containing lithium-ion batteries, for which it is especially economical, though it can generally also be used to process other battery materials.



A continuously operating shockwave system for industrial use.



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.

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