Laser disassembly of lithium battery technology

Can laser batteries be recycled in a fast loop?
These enormous quantities of vehicle batteries must be recycled in a fast loop due to the increasing shortage of critical raw materials. Laser technologies offer the possibility to perform many of the necessary process steps of dismantling and recycling.

Can laser technology be used in cutting and ablating processes?
Laser technologies offer the possibility to perform many of the necessary process steps of dismantling and recycling. In this paper,an application overview and analysis of laser technologies in the field of cutting and ablating processeswill be presented.

How do you disassemble a battery pack?
To conduct the operations,destructive disassemblyhas been a prevailing practice. The disassembly phase of the battery pack includes cutting cable ties,cutting cooling pipes,and cutting bonded battery modules and the battery bottom cover for separation .

Can EV Lib disassembly be automated?
To address this issue, Hellmuth et al. introduced a method for the automated assessment of EV LIB disassembly. The method comprises two evaluation categories, where the first pertains to the feasibility of automating disassembly operations, and the second focuses on determining the necessity of automation.

What are the ablative and cutting processes of battery packs?
The cutting processes are primarily focused on the dismantling of metal and metal-plastic components of battery packs. Furthermore, in the ablative processes, the ablation of active material of the battery electrode foil using ns-pulsed lasers is investigated.

How long does a lithium ion battery last?
The average lifespan of LIBs is approximately 8-10 years. A LIB will be considered to reach the end of its service life once the battery performance,based on the state of charge (SOC),the state of health (SOH),and/or the state of function (SOF),reflects an irreversible degradation compared to its design specification or ideal status .

In order to realize an automated disassembly, a computer vision pipeline is proposed. The approach of instance segmentation and point cloud registration is applied and validated within a demonstrator grasping busbars from the battery pack.

The ramp-up of new production infrastructure to manufacture lithium- ion batteries for battery electric vehicles is moving ahead at a rapid pace. These enormous quantities of vehicle batteries must be recycled in a

fast loop due to the increasing shortage of critical raw materials. Laser technologies offer the possibility to perform many of the necessary process steps of ...

In case of electric vehicles (EV) powered by lithium ion traction batteries (LIB), remanufacturing processes nbecome increasingly important due to their rising market share and valuable raw materials.

This survey aims to provide a systematic update on the latest development of disassembly technology for used lithium-ion batteries (LIB). Artificial intelligence and human ...

This paper summarizes the recycling technologies for lithium batteries discussed in recent years, such as pyrometallurgy, acid leaching, solvent extraction, electrochemical methods,...

For this purpose, this paper performs a compact benchmark analysis of different separation technologies to identify initial potentials and challenges for laser-based disassembly of automotive battery packs. 182 Max Rettenmeier et al. / Procedia CIRP 122 (2024) 181âEUR"186 limited resources of rare earth elements including nickel, manganese ...

This survey aims to provide a systematic update on the latest development of disassembly technology for used lithium-ion batteries (LIB). o Artificial intelligence and human-robot collaboration (HRC) to uphold LIB disassembly technology are pinpointed. o LIB knowledge representation for disassembly, HRC-based LIB disassembly planning, and HRC-based LIB ...

Lithium-ion (Li-ion) batteries have become the preferred power source for electric vehicles (EVs) due to their high energy density, low self-discharge rate, and long cycle life. Over the past ...

2.2. Disassembly Process of Lithium-Ion Traction Batteries The disassembly of lithium-ion traction batteries after reaching their end-of-life (EoL) represents a promising approach to maximize the purity of the segregated material [5]. The research topic of disassembly is, therefore, also increasingly addressed in research in terms

In this paper, an application overview and analysis of laser technologies in the field of cutting and ablating processes will be presented. The cutting processes are primarily focused on the ...

This study provides a comprehensive analysis of global patent trends in battery recycling, focusing on secondary batteries and related technologies across Korea, China, and the United States. The... The global energy transition relies increasingly on lithium-ion batteries for electric transportation and renewable energy integration.

In order to realize an automated disassembly, a computer vision pipeline is proposed. The approach of instance segmentation and point cloud registration is applied and validated within ...

Laser disassembly of lithium battery technology

This study presents a novel laser ablation assisted disassembly method with X-ray and optical validation for opening cylindrical battery cells without damaging the jelly roll. The objective...

The operator"s position must be tracked through safety monitoring systems such as 2D laser scanners or 3D radar sensors. Combining classic safety fences and 3D safety radars was the choice to enable effective human-robot workspace sharing during disassembly operations. The safety fences avoid the operator"s access where the access is not supposed ...

This survey aims to provide a systematic update on the latest development of disassembly technology for used lithium-ion batteries (LIB). Artificial intelligence and human-robot collaboration (HRC) to uphold LIB disassembly technology are pinpointed.

Semi-destructive disassembly technologies will be key to developing efficient disassembly processes for end-of-life automotive traction batteries. Laser-based separation technologies ...

Web: https://degotec.fr