

## PRESSEINFORMATION

Aachen, den 09.02.2022

Laboratory for Machine Tools and  
Production Engineering (WZL) of RWTH  
Aachen University

Viktoria Ingelmann  
Head of Press and Public Relations

## Laser Processing Unit for Highly Reflective Materials

Campus-Boulevard 30  
52074 Aachen  
GERMANY

Phone: +49 241 80-27554  
Fax: +49 241 80-22293  
v.ingelmann@wzl.rwth-aachen.de  
www.wzl.rwth-aachen.de

### Green Laser Radiation in Electric Vehicle Production

The automotive industry is undergoing a transformation. High CO<sub>2</sub> emissions make it necessary to develop alternative drive concepts, and electric vehicles currently represent the most promising solution. One of the most relevant joining technologies for electromobility components is laser beam welding. High precision, non-contact welding joints and flexible process design options make it possible to meet high quality requirements. Materials such as copper and aluminum are frequently used due to their good electrical and thermal conductivities.

However, conventionally used infrared lasers (IR) are only absorbed to a small extent by these highly reflective materials at room temperature. One solution for joining these materials is the use of green laser radiation, which is absorbed more strongly in copper by a factor of about 5 compared to IR.

In order to improve the performance of the green laser for the production of electric vehicle components, a comprehensive concept for a modular laser processing unit with green laser radiation is being developed and compared with conventional infrared lasers as part of the WZL research project "GreenPIs". For this purpose, parallel work is being carried out in the research fields of process optimization and monitoring, fixture and safety technology, and a system layout adapted to the application field of electric vehicle components.

At the Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University, the research work is being implemented in practice using the infrastructure of the start-up factory at RWTH Aachen University and tested under real conditions: Preliminary components and prototype parts are manufactured using laser cutting and additive manufacturing. The safety concept and battery prototypes are developed, tested and assembled in the laser welding cell. A high degree of maturity of the research results is to be achieved through the full consideration of process development up to a complete plant layout, which ensures a fast industrial use of the research contents.

In August 2020, the digital kick-off of the research project "GreenPIs" successfully took place under the leadership of the consortium leader Bayerisches Laserzentrum (blz) and the Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University, thus ushering in the project duration of two years. In two consortium meetings at the RWTH Aachen Campus in Aachen and at the Bavarian Laser Center in Erlangen, initial system and fixture concepts were developed and welding tests with battery components were carried out in the start-up factory at RWTH Aachen and in the blz's technical center.

The consortium of four partners sees the project as a great opportunity for Germany as a manufacturing location. The results of "GreenPIs" are intended to give small and medium-sized companies in particular access to new product fields and sales markets in the changing automotive industry.

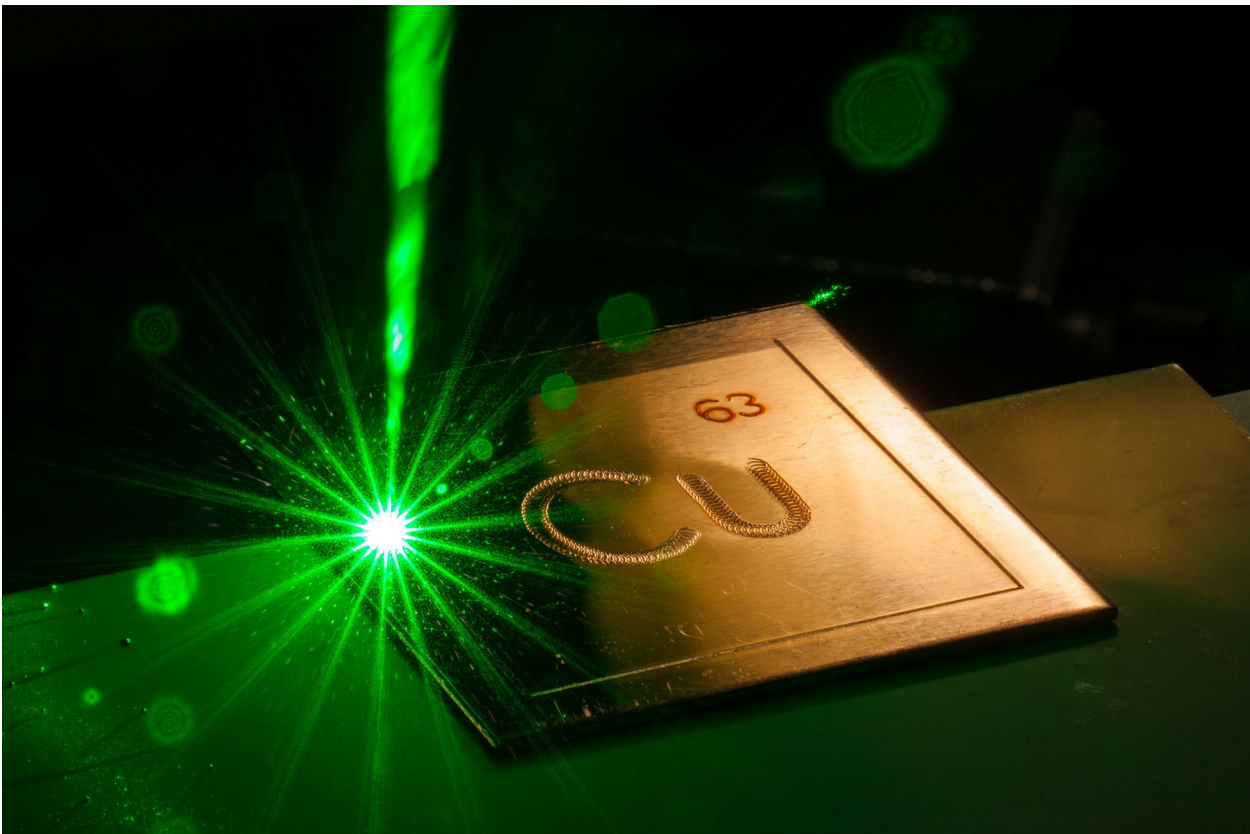
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### **Projectpartner „GreenPls“**

- Bavarian Laser Center GmbH
- HAIMERL Lasertechnik GmbH
- HST H.Steinhardt GmbH
- Chair of Production Systems Engineering of the Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University

### **Photo**



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### **Contact**

Christian Höltgen, M. Sc.

Phone.: +49 01574427289

Mail: [c.hoeltgen@wzl.rwth-aachen.de](mailto:c.hoeltgen@wzl.rwth-aachen.de)



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### **Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University**

The Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University promotes the innovation drive and competitiveness of industry with trend-setting basic research, applied research and with resulting consulting and implementation projects in the field of production engineering. In the research fields of manufacturing technology, machine tools, gear technology, production engineering as well as production metrology and quality management, practical solutions for resource-efficient production are developed with industrial partners from a wide range of sectors. Industry 4.0 topics such as digitalization, individualization, automation, robotics, data monetization, sustainability, artificial intelligence and 5G are addressed alongside the classic problems of manufacturing companies.