

## Press Release

### **Laser drying of electrode coating in lithium-ion batteries: IDEEL research project aims to scale up the process to industrial production speeds for the very first time**

#### **Laser-based drying replaces convection dryers and thus supports more climate-friendly and economical production processes**

*The IDEEL research project, supported by the German Federal Ministry of Education and Research (BMBF) as part of the Battery 2020 funding program, aims to launch a laser drying process for a more climate-friendly and economical series production of lithium-ion batteries. The results will be incorporated into the Fraunhofer Research Fab Battery Cells (Forschungsfertigung Batteriezelle) in Münster, Germany, which will enable users from both industry and research to test and optimize the series production of new batteries.*

**Mülheim-Kärlich, November 23, 2021** – The Goal of this project is to develop an industry-relevant laser drying process that supports a more climate-friendly and economical series production of lithium-ion batteries. With this background in mind, the funded research project IDEEL (Implementation of Laser Drying Processes for Economical & Ecological Lithium-Ion Battery Production) was launched on October 22, 2021. The project has a duration of three years. It will contain the development of an exemplary laser drying system that will demonstrate a near-production drying of the electrode coating in high-performance batteries. The planned system will take up less production space, and will also operate faster and be more energy-efficient than conventional drying technologies\*. This project is conducted by the following research partners:

- Laserline GmbH
- Coatema Coating Machinery GmbH
- Optris GmbH
- Fraunhofer Institute for Laser Technology (ILT)
- Fraunhofer Research Fab Battery Cells (Forschungsfertigung Batteriezelle, FFB) at the Fraunhofer Institute for Production Technology (IPT)
- Münster Electrochemical Energy Technology (MEET), Battery Research Center / Batterieforschungszentrum der Westfälischen Wilhelms-Universität Münster (WWU University)
- Production Engineering of E-Mobility Components (PEM) of the Rheinisch-Westfälische Technische Hochschule Aachen (RWTH University)

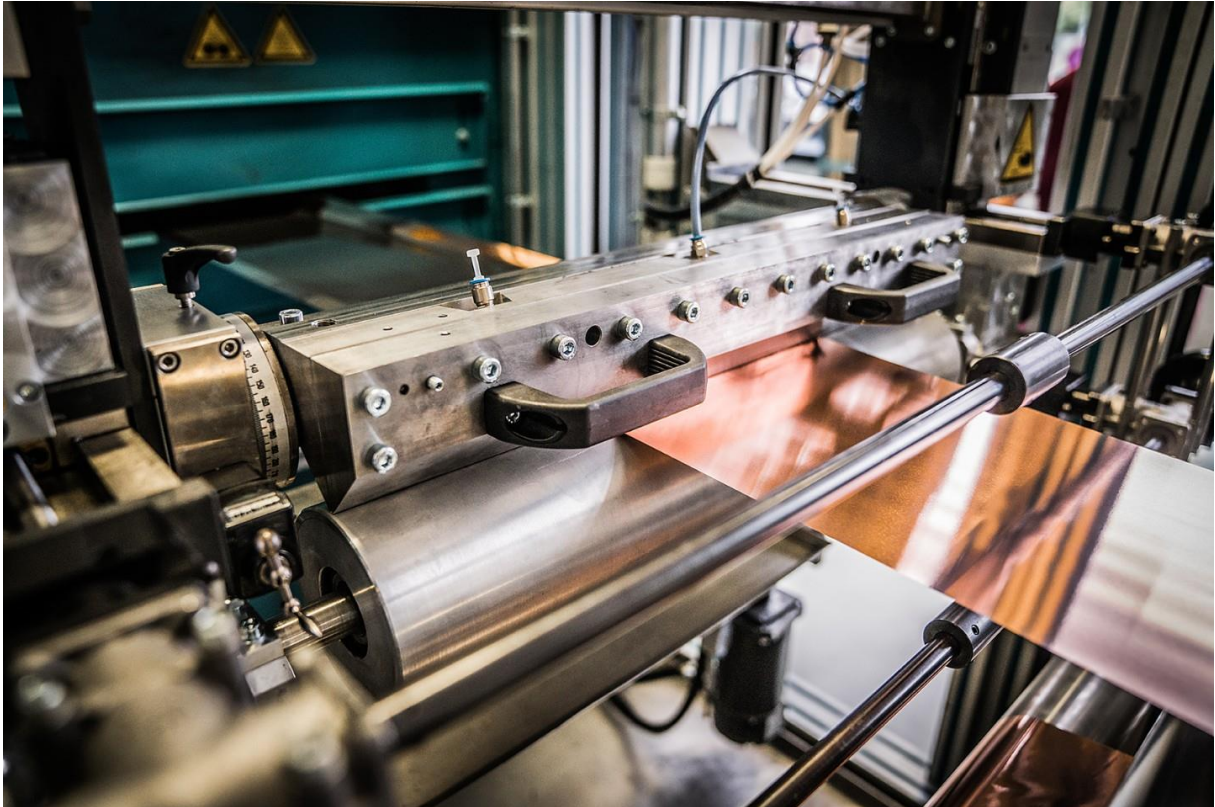
Within the IDEEL initiative, the project partners are pursuing several sub-goals. The first step involves the development of a new electrode slurry optimized for laser use, which will be used as a coating material (PEM RWTH, MEET WWU). Furthermore a highly efficient laser system with a large-area, homogeneous laser spot (Laserline), and a highly integrative process monitoring system based on contactless temperature measurement (Optris, Laserline, Fraunhofer ILT) will be implemented. Based on this, the laser-based drying process is to be scaled up to industry-standard feed rates within a demonstrator (Coatema); and finally, the physical model of the new drying process is to be validated (ILT, FFB). The

research project is supported by the German Federal Ministry of Education and Research (BMBF) as part of the Battery 2020 funding initiative.

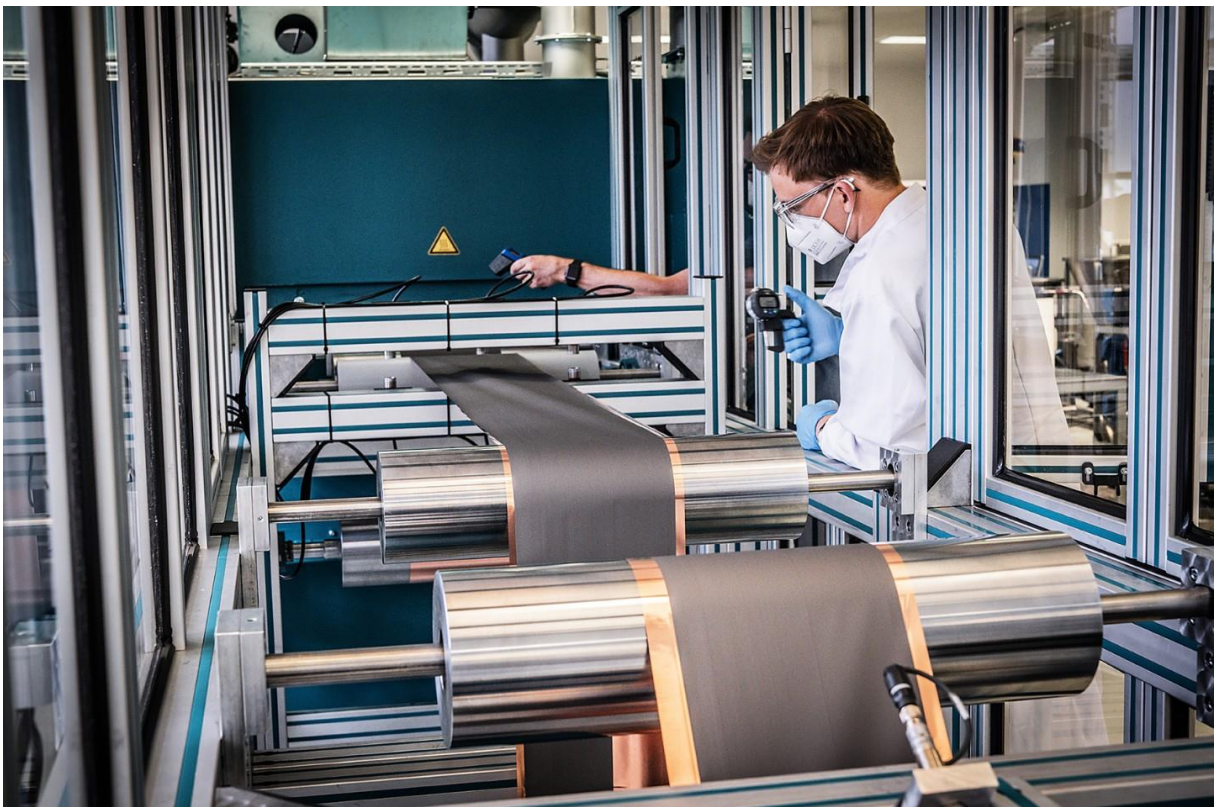
In the future, the results of the IDEEL project will be incorporated into the processes of the Fraunhofer Research Fab Battery Cells (Forschungsfertigung Batteriezelle, FFB), which is supporting the project with conceptual and advisory guidance. The FFB is considered one of the leading projects in German battery research. According to its operators and sponsors, the institution is to be formed into a development center of modern battery cell production for Germany and its European partners. A complete production infrastructure is therefore currently being built at the Münster location, which will enable companies and research institutions to test and optimize the series production of new batteries. The goal is to generate an efficient, low-cost and high-quality battery production that significantly and permanently reduces German and European producers' dependence on the global market. The German Federal Ministry of Education and Research (BMBF) and the state of North Rhine-Westphalia are funding the establishment of this research production facility with a sum of up to 680 million euros.

**\*Laser drying in the context of battery manufacturing**

The drying process, addressed by the IDEEL project, is part of the electrode manufacturing process for high-power battery cells, such as those used in electric vehicles or home storage systems. Until now, convection dryers have been used to heat-dry this electrode coating, but they only transfer their thermal energy indirectly into the material and thus place a heavy burden on the CO<sub>2</sub> balance and the energy costs of battery production. The IDEEL project partners are therefore focusing on upscaling to a more energy-efficient drying process in which the coating is irradiated using high-power diode lasers. The process benefits from the high absorption of infrared laser light by the coating material and allows a more flexible and precise process control compared to common convection technology. This will be demonstrated in the project at drying speeds of up to 30 meters per minute. The compact design and efficient energy transfer are expected to significantly shorten the space-intensive drying sections, which are typically more than 100 meters long. Thus, the laser drying technology should significantly reduce the space required within the production environment and thus enable a faster and more energy-efficient process control.



**Picture 1: The copper foil is continuously coated with an electrode slurry through a slot die**  
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**Picture 2: The coated foil (electrode) is submitted to a precise quality inspection and coiled**  
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**About Laserline:**

Laserline GmbH launched its business in 1997 in the German city of Mülheim-Kärlich (next to Koblenz). As a leading international manufacturer of diode lasers for industrial material processing, Laserline has since become the very embodiment of this innovative technology and can look back with pride at 23 years of corporate history. More than 5,000 high-power diode lasers from Laserline are currently in use worldwide and have proven their efficiency in a wide range of different processes and applications. Currently, the company employs about 350 people and has several international subsidiaries in the USA, Brazil, Japan, China, South Korea and India, as well as representatives in Europe (France, UK, Italy) and in the Asia-Pacific region (Australia, Taiwan). The company is also highly focused on sustainable growth, so that by setting up its headquarters in Mülheim-Kärlich, the spatial conditions for future expansion in terms of development and production were thus laid from the get-go. More information at <https://www.laserline.com/de-int/>

Within the context of the IDEEL project, Laserline is focusing on the development of a homogeneous and efficient laser system technology for large-area drying in electrode production. The starting point for the development work is the high-power diode lasers of the Laserline LDF series, which are destined for surface drying due to their extremely homogeneous energy input and millisecond-fast stepless power control. As part of the plan to launch a more climate-friendly and economical battery production, one of the most important project goals is to further increase the efficiency of the high-power diode laser, even as it claims the highest energy efficiency among all industrial lasers. Furthermore, to enable a high-precision process control, Laserline will develop special process optics based on its proven beam-shaping optics to enable integrative process monitoring.

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