# Laser-beam welding of electrode stacks for lithium-ion battery cells

The electrical contacting of electrode stacks is an important step in the manufacture of lithium-ion battery cells. To increase productivity, Fraunhofer ILT is developing an overall process directly linked to electrode production in order to automatically manufacture the electrode-separator composite of a lithium-ion battery cell. As a result, the project presented below is expected to help reduce the overall costs in the production of electric vehicles and thus strengthen the value chain of electromobility.

## High speed contacting of electrode foils

In the HoLIB project, Fraunhofer ILT is developing a laser-beam welding process to contact electrode foils for Li-ion battery cells at a very high speed. Depending on the process regime (heat conduction welding or deep penetration welding), the institute is investigating the parameters power, feed rate, beam shape and irradiation strategy with different wavelengths. It is focusing on fiber lasers (1070 nm), »green« disk lasers (515 nm) and »blue« diode lasers (450 nm). Important criteria here are the geometric dimensions of the weld seam, such as the width and height of the top bead, and the microstructure.

## Productivity increase in cell production

Thanks to the laser-beam welding process developed and the associated pressing device, the electrode foil stack can be contacted with the arrester tabs in a single process step. The weld geometry is dimensioned according to the required current carrying capacity with the aid of local power modulation and can be flexibly transferred to other cell formats. Both copper and aluminum are used as materials. Since the absorption is adapted by the beam shape and wavelength as well as the associated energy input, the cell stacks can be joined without damaging the individual foil layers. The institute is using different irradiation concepts, depending on the material and composite thickness. The ProZell 2 cluster aims to increase productivity in the production of battery cells. In addition, laser-beam welding of thin electrode foils can also be transferred to other industrial areas.

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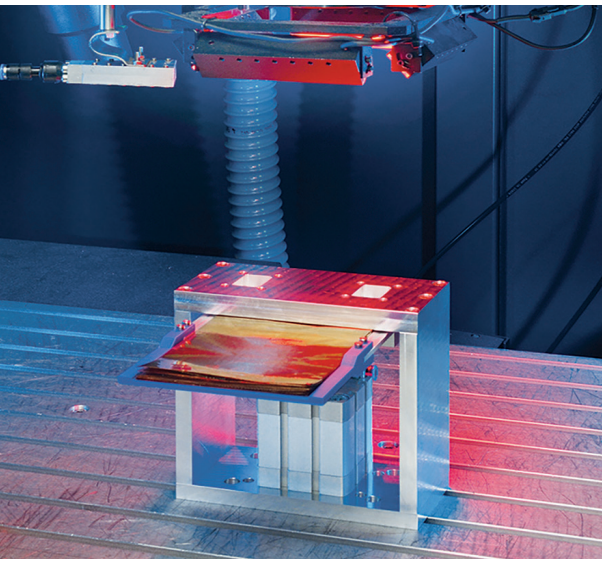

*1 Laser-beam microwelding of electrode stacks with a wavelength of 1070 nm.*
*2 Cross-section of the contacting of the copper foils to the arrester tab.*
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