

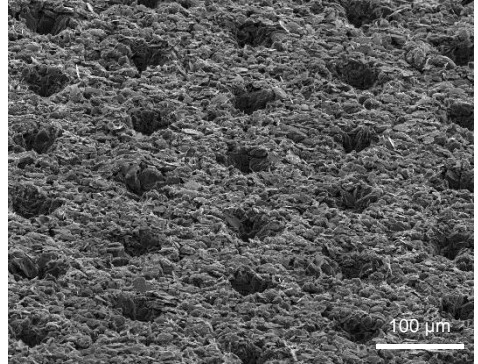
Thermophysical Modeling of Laser Structuring of Battery Electrodes

Motivation

The introduction of microscopic diffusion channels into graphite anodes offers great potential for a performance enhancement of Li-ion batteries. Previous studies showed a positive effect on the fast-charging ability and lifetime of batteries as well as the wetting with electrolyte. Short-pulsed laser radiation is a versatile tool to introduce such microscopic drillings into the battery electrodes. The understanding of the ablation mechanism is however limited to date.

Scope

This master thesis project aims at a deepening of the knowledge about the laser ablation process of electrode coatings by short laser pulses. Therefore, a thermophysical model of the process shall be developed and numerically simulated. The obtained results have to be refined with experimental data. The goal is to identify correlations between process parameters and material properties on the one hand side and the obtained structures on the other hand side. Finally, recommendations for process strategies should be derived.



Scanning electron microscopy image of a laser-structured graphite anode

Requirements

- Interest in laser physics and renewable energy technologies
- Autonomous and structured working attitude
- German or English language skills
- Knowledge in the field of modeling or simulation beneficial, but not necessary

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