Lasers4NetZERO Newsletter

November 2026

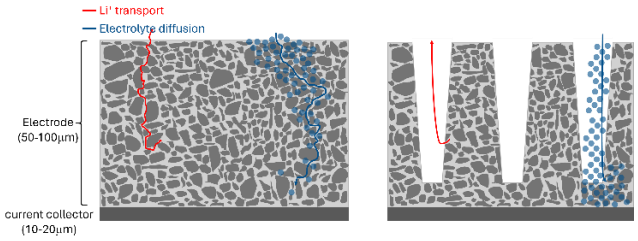
Laser driven innovation for Advanced Battery Manufacturing

Light powered solutions for next generation electric vehicles (EVs) batteries

As the demand for EVs continues to grow, improving battery performance has become a key challenge in the transition towards net-zero emissions. While high energy density and high power density are essential for next-generation batteries, achieving both remains a significant challenge. At UniBO, our research focuses on maximising battery performance through laser processes.

Proposed Solution: Laser Structuring

Our research explores an innovative approach in overcoming these limitations through laser structuring of battery electrodes.

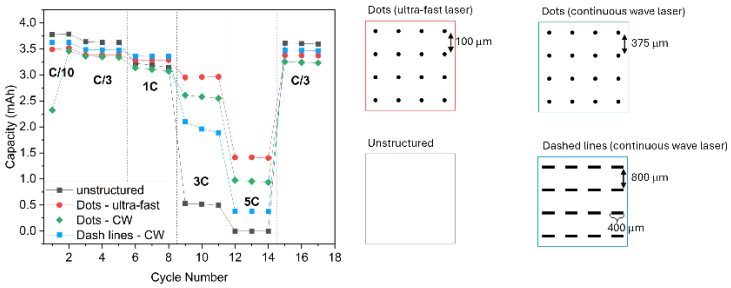


From continuous wave to ultra-fast laser technology, the surface of the electrode is precisely modified with a contact-free process, leading to power and energy density enhancement while minimising unwanted thermal effects, opening new possibilities for more efficient and sustainable battery production. Research has been conducted on thick high-nickel cathode materials.

Key Results

The experimental results demonstrate the potential of laser structuring, in particular:

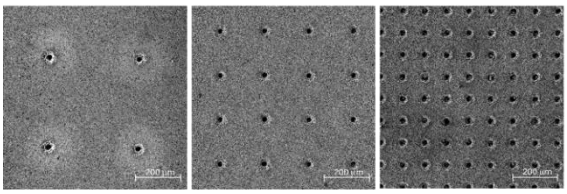
- Minimising process defects and developing more efficient next-generation batteries.
- Improve energy density, reduce ionic transport limitations and enhance battery cell stability



These findings highlight the potential of ultrafast laser processing as a valuable technology for advanced battery manufacturing.

Scientific and Industrial Impact

This research received important recognition, receiving the Second Best Paper Award at ICALEO 2026 Conference in Denver, USA. Furthermore, the project contributed to industrial innovation through a patent with Ferrari S.p.A., highlighting the potential for translating scientific research into real-world manufacturing applications.



Publications

Ultrafast Laser structuring of thick NMC90 cathodes for enhanced high-rate performance and reduced tortuosity, Carolina Magrini, Alessandro Gregucci, Caterina Angeloni, Nicolò Minafra, Marco Cristofalo, Alessandro Ascari, Erica Liverani, Alessandro Fortunato, *J. Power Sources*, 2027, 699, 241800, https://doi.org/10.1016/j.jpowsour.2026.241800

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