# Press release

## Striking a cord in battery research with own scientific contributions
### Co-author Dietmar Lerche honoured for a Top viewed Wiley article in 2025

Berlin, 2 June 2026:
LUM GmbH is renowned for its scientific and metrological expertise, specializing in particle characterization, stability assessment of suspensions and emulsions, determination of adhesion strengths, as well as quality assurance and process optimization. LUM is equally recognized for its patented technologies and scientific application studies, and serves as a scientific partner, sponsor, and contributor to various international standardization organizations and technology promotion initiatives.
LUM's contributions to battery and fuel cell research fit squarely within this context, building upon the STEP-Technology®—developed by LUM for characterizing particle properties and interactions—as well as the CAT-Technology® for determining the mechanical strength of electrode layers. While STEP-Technology, combined with optical detection, has been employed in fields such as fuel cell technology since as early as 2008, the integration of X-ray radiation in recent years has contributed significantly to the simple and rapid characterization of battery pastes at their original concentrations—thereby enabling a level of product and process control that is not achievable using optical analytical methods.
In 2024, the Open Access article "Key Control Characteristics of Carbon Black Materials for Fuel Cells and Batteries for a Standardized Characterization of Surface Properties" was published online in *Particle & Particle Systems Characterization*, appearing in the print edition (Vol. 42, Issue 1, 2400069) in January 2025. This article was recognized as a "Top viewed Wiley Article" of 2025.
Lead author Amin Said Amin and his co-authors—including Dietmar Lerche, Managing Director of LUM GmbH—focus on commercially available carbon blacks (CBs), with particular emphasis on application-relevant Key Control Characteristics (KCCs). In modern batteries, fuel cells, and hydrogen production, CBs are primarily utilized as nanoscale support materials. During the manufacturing process, CBs, catalysts, and proton-conducting polymers (ionomers) undergo dispersion and homogenization procedures for electrode coating. The interactions between the components within the dispersion and the surface of the CB particles are complex. The surface properties of the CB particles influence the slurry formulation, the electrode coating process, and the resulting electrode layer; consequently, they impact the performance and service life of fuel cells and batteries.
The KCCs encompass physicochemical properties such as electrical conductivity (electron transport through the catalyst layer (CL)), oxygen-containing surface groups (hydrophilicity/hydrophobicity), surface basicity or acidity, ionomer adsorption, and particle dispersibility (catalyst ink stability). These KCCs are determined based on the electrical conductivity of the particle mass, Boehm titration (BT), the isoelectric point (IEP), and Hansen Dispersibility Parameters (HDP).
The HDPs—understood here as similarity parameters for particles—provide insight into how nanoparticle surfaces interact with liquids during the dispersion process. This analysis utilizes analytical centrifugation and the LUMiSizer instrument developed by LUM. The proposed KCCs serve as a starting point for the characterization of CBs and as a guide for product design, enabling the elucidation of meaningful structure-property relationships—a prerequisite for a successful energy transition. [https://onlinelibrary.wiley.com/doi/10.1002/ppsc.202400069].
The results have already culminated in a draft standard within the framework of the International Electrotechnical Commission (IEC), TC 113: Nanomanufacturing – Key control characteristics - Part-4-16 Nano enabled storage -Hansen dispersibility parameters of carbon black for the electrodes of electrochemical devices: Sedimentation velocity method.

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Enclosure:
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