



APPLICATIONS FOR BATTERY TECHNOLOGY



BASIC MATERIALS



COMPONENTS



ASSEMBLY



RECYCLING

ATM Qness GmbH

Emil-Reinert-Str. 2 · 57636 Mammelzen · Germany

Tel. +49 2681 9539-0

info@qatm.com · www.qatm.com

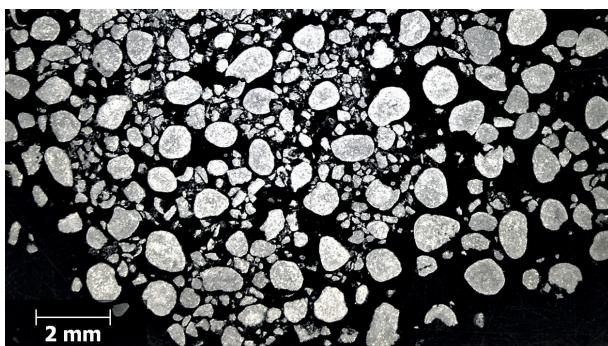
part of **VERDER**
scientific

MATERIALOGRAPHY

INVESTIGATION OF LITHIUM METAL OXIDE PARTICLES

Lithium metal oxide particles are subjected to metallographic preparation and examined by light microscopy and scanning electron microscopy with EDX detector to investigate their size and chemical composition.

QATM's epoxy-based cold mounting materials (KEM 90 and KEM 92) allow for mounting the oxide particle powders without any gaps, preparing them for grinding and polishing. Thanks to an extensive selection of polishing cloths and polishing diamond suspensions, a wide variety of lithium metal oxide particles can be prepared. The Qdoser system is used for automated dosing during polishing and fine polishing.



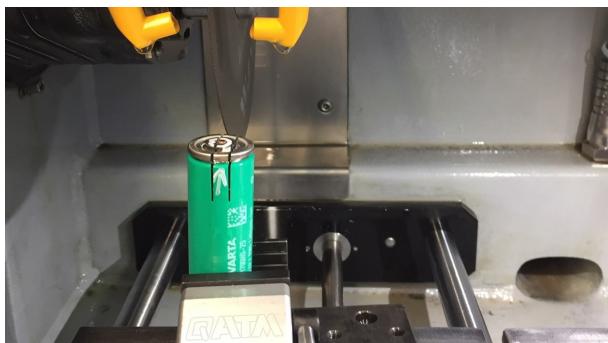
An example of powder particles mounted in KEM 90.

MATERIALOGRAPHY

CUTTING OF LITHIUM-ION BATTERIES

LIB cutting can vary depending on the desired outcome. Cut-off machines can be used for sectioning the battery casing to take the whole jelly roll out, or for cutting the whole battery with casing and electrodes, while a scalpel is suitable for sectioning only the electrode foils.

A rotating clamping tool is used to cut the casing and take the jelly roll out. QATM cut-off machines offer a wide range of clamping tools for sectioning entire batteries. The image below demonstrates an LIB cutting process.



Sectioning of a complete LIB with QATM cut-off machine



AUTOMATIC DOSING SYSTEM QDOSER ECO & CONSUMABLES

SHORT FACTS

- Metallographic preparation for optical microscopy investigation
- Corresponding consumables for battery casing preparation

FIELD OF USE

- Research & Quality Control



CUT-OFF MACHINE
QCUT 350 A

SHORT FACTS

- Saving time by cutting the sample near to the target surface.
- Use of rotation device to clamp the samples.

FIELD OF USE

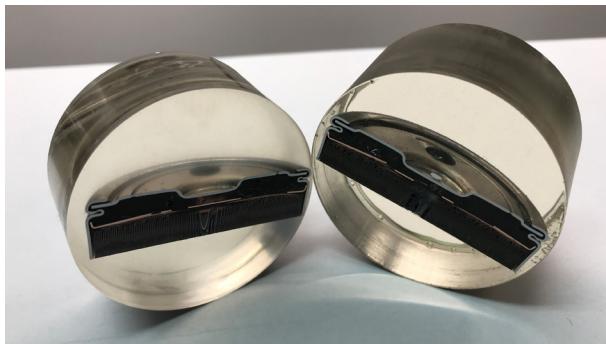
- Research & Quality Control



MATERIALOGRAPHY

MOUNTING OF LITHIUM-ION BATTERIES

Mounting Lithium-Ion batteries involves different techniques depending on the components being handled. The casing and spot weld can be hot mounted in some cases, but the electrodes require cold mounting due to their sensitivity to temperature and pressure. Mounting can be performed before cutting to ensure foils and other components remain in the sample. It can also be done after cutting to prepare the sample for grinding and polishing. To prevent gaps between the mounting materials and the sample during cold mounting, it is recommended to use mounting materials with minimal volume shrinkage and polymerization temperature. For mounting LIBs, the epoxy-based cold mounting materials QATM KEM 90 and KEM 92 are the best choices due to their low polymerization temperature of 60°C and 35°C, respectively, and minimal gap formation.

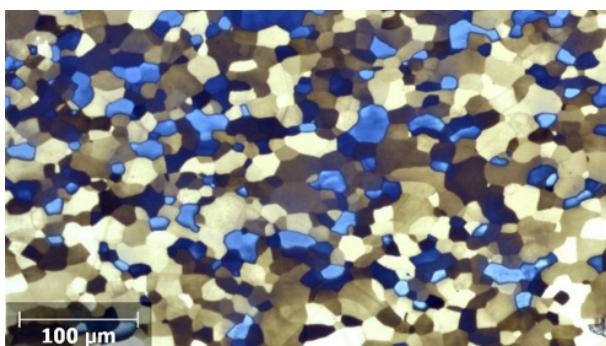


Cold mounted LIB samples

MATERIALOGRAPHY

GRINDING AND POLISHING OF LITHIUM-ION BATTERIES

Grinding and polishing can be done on different parts of LIBs. Sometimes the casing should be prepared and examined under light microscopy or SEM (also with EBSD detector), in other cases the electrodes or spot welds should be prepared. The cap of the LIB is in many cases low carbon steel with Ni-coating. The image shows the cap of an LIB after 1 µm polishing and etching with Klemm I. For powering certain devices, large battery packs consisting of multiple lithium-ion cells connected in parallel-series configurations are required. A robust and flawless spot weld is a critical concern for many industries, like aerospace. The other important parts of LIB are electrodes. The anode is often a copper foil coated on one or both sides with graphite, and the cathode is in many cases an aluminum foil coated on one or both sides with metal oxide particles (for example LiNiMnCoO_2 particles).



The microstructure of the LIB-casing after etching with Klemm I for 40 seconds



**HOT MOUNTING PRESS
QPRESS 50**

SHORT FACTS

- Using epoxy-base cold mounting materials with minimum polymerization temperature and shrinkage.
- High flexibility by hot mounting due to preheating function, cooling modes, maintenance tasks and user account management feature.

FIELD OF USE

- Research & Quality Control



**GRINDING & POLISHING MACHINE
QPOL 250 A2-ECO**

SHORT FACTS

- Water-free polishing suspensions and lubricants
- High reproducibility because of automatic preparation

FIELD OF USE

- Research, Quality Control & Production

