

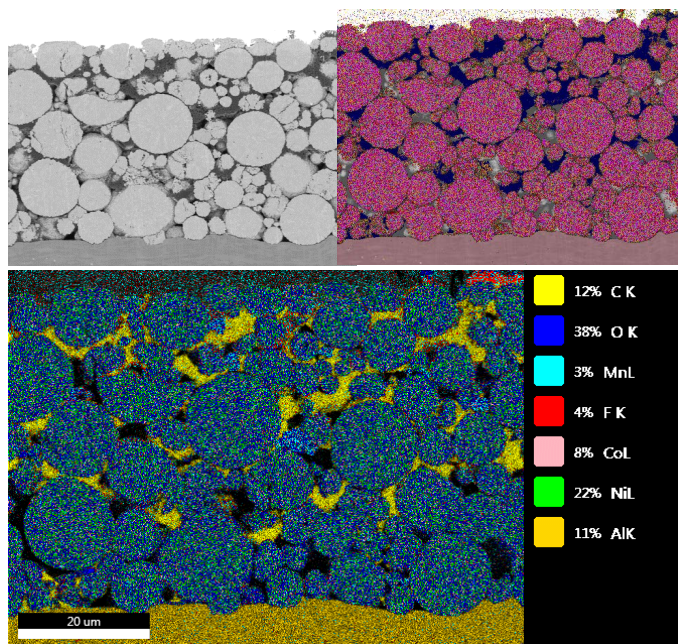
Better understand chemistry interaction between components in a lithium-ion battery through combining EDS with SEM data

Multi-modality chemical analysis

The process to understand the chemical composition of battery materials is complex and time-consuming. It is important to understand how each component interacts with every other component.

Key information may be coming from different detectors, at different resolutions, and it is hard to combine low-resolution chemical information with much-higher resolution grayscale data. Organizations need a way to fuse all these datasets coming from different modalities at different resolutions in a more automated and reproducible way. In this example, SEM and EDS acquisitions are combined.

Once the two datasets are imported, the data usually needs to be prepared for analysis using image enhancement tools to “clean” it, trying to remove or minimize acquisition artifacts, and make it ready for analysis. Different enhancement techniques may be applied to each dataset (for example, EDS may suffer from specific noise, while grayscale may need contrast enhancement or acquisition artifact reduction). After images are enhanced, both datasets need to be merged using registration and super-sampling tools to produce a chemical image at the higher resolution provided by the grayscale image. Once this specific process is done, the grains are segmented and ready for analysis. Analysis and classification may be performed through measurement and quantification. Many different parameters may be defined, including grain size, shape, and distribution, but also grain interface and multiple contact points which will affect the final properties of the sample. The analysis may be summarized in a table, and everything (visuals and table) may be exported, for example, to produce a report.



Thermo Scientific™ Avizo™ Software allows users to take advantage of the high-resolution grayscale image and the chemical low-resolution EDS image to produce advanced measurement on the granular structure in an easy and reproducible way.

With Avizo Software, better characterization of battery components may be performed by using advanced measurements while also increasing the number of analyzed samples through its automation capabilities.

Learn more at thermofisher.com/avizobatteries

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