ANALYTICAL SOLUTIONS FOR THE LITHIUM-ION BATTERY VALUE CHAIN. Bernd Bletzinger, Nora Engel, and Florian Schuart. Analytik Jena. Presenter: **Bartosz Jasiak**

The production of high-quality lithium-ion batteries entails a complex process spanning resource extraction, material refinement, production, and recycling, necessitating meticulous element analysis throughout. This paper explores the challenges and solutions pertaining to elemental analysis in each phase of the value chain, from mining to recycling, in order to ensure optimal quality and safety. Battery manufacturers monitor raw material contaminants to guarantee product quality, while recycling facilities verify material purity and comply with environmental regulations. This article highlights the efforts of companies like Analytik Jena, collaborating with the industry, to develop high-quality valuable products based on scientific insights and optimal methodologies, with robust and sensitive analytics as a cornerstone. The upstream process is explored first, addressing ore exploration and refinement. Eighty percent of a Li-ion battery's value is determined by its constituent materials, emphasizing the need for premium-quality resources. China currently dominates both raw material extraction and battery production, with the European market largely relying on imports. However, the discovery of lithium deposits in other regions offers potential for increased production independence. The extraction of key materials for lithium-ion batteries involves complex processes. This paper discusses different aspects of quantifying these elements in various phases of the battery life cycle, touching on sample preparation and spectroscopic techniques for element analysis. Furthermore, the monitoring of wastewater from the battery production process using various analytical techniques to comply with environmental regulations is addressed. In conclusion, the critical role of analytical techniques in ensuring the quality and environmental responsibility of lithium-ion battery production is discussed.