

In Search of Confirmation - Traceability of Resource Analytical Methods

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A modern circular economy for metallic and mineral raw materials requires the use of both primary and secondary raw materials, since it is impossible to operate without losses. The conversion of energy production to renewable energy sources envisaged in Germany and Europe demands the use of a large number of metallic raw materials, starting with commodities such as copper and steel and ending with critical metals such as Li, Co, In, Ga or Ge in significantly higher quantities than required by traditional technologies. An energy transition to renewable energies that is consistently thought through to its end requires planning for the recycling of the raw materials used for this from the very beginning.

This poses enormous challenges for resource analytics, a means of providing critical information for the development of energy-efficient and resource-saving technologies. In addition to high-precision standard chemical and phase analysis methods, this involves the use of spatially resolved, automated, imaging analysis methods, in-situ analyses using portable instruments, and various qualitative and quantitative process analytical methods.

Neutron activation analysis and prompt gamma activation analysis methods will rarely be used as near-process methods with short response times, but have the potential to solve fundamental challenges in resource analysis, such as:

- Characterization of different types of reference materials for recycled materials, especially those for difficult-to-analyze elements.
- Ensure traceability of resource analytical methods for the detection of halogens (F, Cl, Br, and I) in wide concentration ranges in difficult matrices such as plastics, black mass of battery recycling, electronic scrap, or shredder fines,
- Ensure traceability of resource analytical methods for detecting trace levels of critical metals in intermediate and final products of pyrometallurgical and hydrometallurgical processes,
- Control analyses to determine the origin of raw materials as well as intermediate and end products in the sense of ensuring sustainable and secure supply chains as required by the industry due to current national and international regulations.

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