The Analysis of Lithium Battery Metals and Commodities Using Field Portable Techniques

A.Somers[1]

1. Global Business Director: Geochemistry, SciAps Inc. Woburn, MA, USA

ABSTRACT

The elemental analysis of critical inputs to lithium ion battery manufacturing such as materials containing Li, Ni, Co, Mn and C [as graphite] is important throughout the value chain from exploration to disposal and recycling. Using conventional laboratory techniques for the measurement of these elements and the form they are present in typically require multiple analytical techniques and associated samples preparation. Portable elemental analysis devices offer inexpensive, high throughput options to compliment conventional laboratory based analytical programs but do have limitations. For example, many of the elements of interest stated above are either not possible using portable XRF or suffer from interferences that make reliable analysis problematic. Recent developments in field portable analytical technology has seen the advent of hand held Laser Induced Breakdown Spectroscopy or LIBS analysers that allow the analysis of elements such as Li and C that are not possible with pXRF. LIBS also presents opportunities to measure Co without interference from other associated elements as is experienced with pXRF in the case of Fe interfering with the measurement of Co. As is the case with laboratory analysis no one technique provides optimised performance across the whole range of analytical requirements. For example pXRF offers superior performance to LIBS on transition metals such as Ni and Mn and other deleterious elements in ores and mineral processing products such as As and other heavy metals.

This study presents a summary of the current capabilities related to this application using the portable chemical analysis techniques of pXRF and LIBS and makes suggestions on how to utilise the available technology in a complimentary way for best results. Comparisons of these field portable techniques with current best practice using laboratory analysis for the specific analytes are also included.