Lithium Detection by Wavelength-Dispersive X-Ray Spectrometry in an Electron Probe Microanalyzer (EPMA)

AS. ROBBES[1], C. HENDERSON[1], M. P MORET[1], T. F. KELLY[2], D. J. LARSON[2]

[1] CAMECA SAS, 29 Quai des Grésillons, Gennevilliers Cedex, 92622, France

[2] CAMECA Instruments Inc., 5500 Nobel Drive, Madison, WI, USA

Present in nature in several rocks and minerals, lithium is being increasingly used for the development of novel materials such as aluminum-lithium (Al-Li) light alloys, reducing the weight of aircraft and aerospace structures, or Li-ion batteries, which deliver higher energy and longer lifetime. Electron probe microanalysis (EPMA) is not the technique of reference for measuring lithium, mainly because the fluorescence yield is relatively low for Li and the matrix in which it is present can highly absorb the Li-Kα wavelength (54.3 eV). The absorption of Li-Kα can be roughly twenty to thirty times higher in a N- or O-matrix than in an Al matrix. Nevertheless, lithium and its compounds have recently received growing interest from materials scientists and geologists and have potential for several industrial applications. It is therefore of interest for analysts to be able to assess lithium in a first approach by EPMA, prior to further characterization using secondary ion mass spectrometry for example. We will present here lithium measurements performed on LiF (Fig. 1) and on Li3Al5Cu (i.e., 9.5 wt.% Li) samples with a CAMECA SXFive EPMA using wavelength-dispersive X-ray spectrometry.

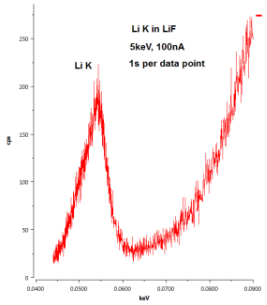

Figure 1. WDS spectrum from LiF specimen showing the LiK line. Analysis conditions: 5 keV, 100 nA, 1s dwell time per point.