Characterisation of Li-deportment in LCT-pegmatites: Application for field identification of Li mineralogy

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ABSTRACT

Lithium is a key component in the production of rechargeable batteries for use in a range of portable electronic devices, such as mobile phones, and in electric/hybrid vehicles. Global demand for Li is forecast to increase by more than 500% in the coming decade, and with Australia (Western Australia) currently supplying ~41% of global demand, understanding the mineralogical controls of both economic (Li,Nb,Ta) and deleterious element (F,Mn) distribution is essential in optimising the design and development of LCT pegmatites to meet this increase. To that end, a 2-year Minerals Research Institute of Western Australia (MRIWA) project (M532), supported by the Geological Survey of Western Australia (GSWA), Galaxy Resources Ltd. and Lithium Australia NL, has been established with the aim of developing a geo-metallurgical framework for WA lithium pegmatite deposits, leading to improved efficiencies in exploration, mineral beneficiation and processing techniques. Part of this program, is the development of practical mineralogical characterisation tools to enable mining companies to predict the metallurgical response of Li-ores to aid mitigation of the risks associated with costly test programs in the initial stages of project development. Hence, the accuracy and precision of a range of hand-held, field-portable analytical devices, such as laser-induced breakdown spectroscopy (LIBS) and Raman spectrometry coupled with secondary ion mass spectroscopy (SIMS) and Infrared (IR) spectroscopy will be assessed and correlated with pegmatite mineralogy to determine their efficacy for quantitative determination of the Li-bearing mineralogy. This study presents initial results of the application of field-portable techniques (e.g. LIBS and Raman analysis) to aid the identification of the Li-bearing and gangue phases that will provide industry with a reliable and first-pass evaluation of the Li potential and metallurgical response of the pegmatite ore-body.

Key words: Lithium, LCT pegmatite, LIBS, Raman spectroscopy