Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.19538

Characterisation of rare cathodoluminescent eucryptite ($LiAlSiO_4$) and its implications on the paragenesis of the Arcadia Pegmatite.

JEREMY C RUSHTON AND RICHARD A SHAW
British Geological Survey
Presenting Author: jere1@bgs.ac.uk

The Arcadia Pegmatite in eastern Zimbabwe is a significant lithium resource, assumed to be Archaean in age, hosted by the Arcturus Formation that forms part of the Harare Greenstone Belt. The pegmatite dominantly comprises petalite, quartz and feldspar, with lesser amounts of beryl, spodumene and eucryptite. The eucryptite is locally abundant[1] and is typically associated with a late, low-temperature alteration stage with calcite, zeolites and clay minerals.

UV-induced fluorescence in eucryptite is well documented [2], [3]; however, we can find no published reports of cathodoluminescent (CL) behaviour in natural eucryptite. Indeed, it has been stated that eucryptite 'does not present any visible cathodoluminescence' [3].

We report on eucryptite from Arcadia that does show a strong CL response. CL patterns (Figure 1) indicate that eucryptite initially formed as coarse (mm-scale), euhedral crystals, displaying both growth and sector zoning marked by apple-green CL. Subsequent formation manifests as void-fills and overgrowths with red CL characteristics, including widespread evidence for microfracture-hosted alteration of the coarse, euhedral eucryptite. Quantitative electron-probe micro-analysis (EPMA) reveals significant differences in the compositions of the two CL end-members (Figure 2), potentially associated with variations in Li content and therefore in formation conditions.

A further suite of microanalytical techniques is planned to better characterise this unusual CL-active eucryptite. This will provide useful insights about the formation of this rare and relatively understudied lithium mineral, and add to the understanding of the characteristics and evolution of an important lithium resource.

[1] Hurlbut (1962), *The American Mineralogist* 47, 557-561.

[2] Leavens, Hurlbut, & Nelen (1968), *The American Mineralogist* 53, 1202-1207.

[3] Charoy, Noronha & Lima (2001). *The Canadian Mineralogist* 39(3), 729-746.