

## Kinetic controls of spodumene and petalite stability: A preliminary investigation

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Lithium aluminum silicates spodumene (LiAlSi<sub>2</sub>O<sub>6</sub>) and petalite (LiAlSi<sub>4</sub>O<sub>10</sub>) are major lithium resources extracted from granitic pegmatites. Mining companies worldwide invest major efforts into lithium-pegmatite exploration. Iron contents can influence both the economic value and the P-T phase boundary between spodumene and petalite. Spodumene compositions compiled from the literature incorporate as much as 4.37 wt% Fe<sub>2</sub>O<sub>3</sub> + FeO (mean of 0.54 ± 0.79, N=56). We have surveyed various natural occurrences of Li,Al silicates in order to evaluate their compositional ranges in primary assemblages, secondary spodumene-quartz intergrowths (SQUI), and miarolitic assemblages.

We have conducted reconnaissance cathodoluminescence (CL) and scanning electron microscopy (SEM) analyses on 15 spodumene and 6 petalite specimens from several world-famous pegmatites and pegmatite districts (Harding, N.M., Pala, CA, Tin Mountain, S.D., and Kings Mountain, N.C., USA; Minas Gerais, Brazil; Tanco, Manitoba and Yellowknife, Canada; Paprok Valley, Afganistan; Barroso-Alvão and Fregeneda, Portugal/Spain; etc.), in preparation for Laser Ablation ICP-MS analysis of minor and trace elements. CL petrography of primary petalite reveals the importance of fluid-assisted deformation in the nucleation and development of SQUI (see figure below).

