

Exploring the effect of lithium on pegmatitic textures: An experimental study

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ABSTRACT

The effect of lithium (Li) on the development of pegmatitic textures was evaluated experimentally at H₂O-saturated and H₂O-undersaturated conditions at 500 MPa pressure and temperatures ranging from 400 to 800 °C. The addition of ~3700 ppm Li to a starting material of common granitic composition (Lake County obsidian) reduces the crystallization and melting temperatures by approximately 50–70 and 200 °C, respectively, and promotes the formation of quartz-feldspar graphic and granophyric intergrowths. The presence of Li in the hydrous granitic system lowers significantly the degree of undercooling needed for the development of graphic and granophyric intergrowths to 85–110 °C in comparison with the Li-free systems where approximately 200 °C of undercooling is necessary. The feldspar crystals developed in Li-bearing samples can incorporate from 150 to 250 ppm Li, assume skeletal and spherulitic morphologies, and exhibit one order of magnitude faster growth rates than crystals in Li-free samples. The results of this study attest to the effectiveness of Li as a fluxing agent and highlight the crucial role it plays in the development of pegmatitic textures, leading to important implications for the conditions of formation of Li-bearing granitic pegmatites.

Keywords: Granitic pegmatites, lithium, undercooling, graphic textures, granophyric textures, fluxing agent