

A New Occurrence of Li-Bearing Pegmatite in Uljin, South Korea: Progressive Evolution from Spodumene to Lepidolite-Bearing Mineralization

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The Uljin district, one of the lithium-mineralized areas in South Korea, is known for Li and/or Sn pegmatites. The Li-bearing pegmatites intrude into various host rocks with an intrusion age from the Mesozoic era (172 ± 1.1 Ma by zircon age and 168-174 Ma by muscovite age). Although the representative Li-bearing pegmatites in Uljin, such as the West, Main, and East ore bodies, share similar formation ages and spatial proximity, numerous studies indicate differences in the assemblages and contents of associated Li-bearing minerals.

This study presents a preliminary analysis of a new occurrence of a Li-bearing pegmatite located adjacent to the existing bodies in Uljin. This pegmatite clearly demonstrates the transition of a lithium-enriched system from spodumene to lepidolite-bearing stages providing paragenetic, textural, and geochemical constraints on magmatic mineralization and late-stage re-equilibration.

Based on occurrence and mineral proportions, the pegmatite is divided into two lithofacies: (1) a perpendicular tabular body characterized by unidirectional solidification textures of spodumene normal to the skarnized host-rock contact, and (2) a laterally expanded body occurring as either lepidolite-banded aplite or a massive lepidolite–fine-grained albite aggregate. The former is dominated by spodumene-quartz-intergrowth with microcline partly replaced by pinkish muscovite from the contact inward. Beryl occurs as inclusions within spodumene, whereas montebrasite occurs as patchy domains along spodumene margins. In the latter, spodumene occurs only as a minor relic, altered to the extent that original textures are faintly preserved in micas. These mineral assemblages define a three-stage evolution, from primary magmatic spodumene–montebrasite mineralization with beryl and apatite, through albitization accompanied by manganotantalite–columbite, lithiophilite, lepidolite, cassiterite, and topaz, to hydrothermal alteration marked by secondary Li phases. This suggests that Uljin lithium pegmatites may be genetically connected into an evolutionary system and their differences in subsequent evolution can vary the Li-mineral assemblages that appear as separate bodies.