Goldschmidt 2024 Abstract
https://doi.org/10.46427/gold2024.23340

Geochronology of the LCT pegmatites in Central Mongolia

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Lithium is mainly extracted from four different sources, one of which is lithium-cesium-tantalum (LCT) pegmatite.

Here we present new geochronological results of an ongoing research on two LCT pegmatites located at a distance of 190 km from each other in the Idermeg terrane of Central Mongolia. The pegmatite dikes of the New occurrence (NWO) occur within marblized limestone of the Neorpoterozoic Oortsog Formation that is intruded by the Cambrian Undurshil granite complex with a Rb-Sr age of 536.01±2.19 Ma. The Undurshil complex is S-type with high alkali contents and formed in a collisional setting. Pegmatite dikes strike 45 degrees to northeast along the NE-trending fault zone with a thickness ranging between 0.3-1.5 m and a length varying from 50 to 150 m. The pegmatite dikes of the Khuld occurrence (KHO) are hosted within an altered zone of granite of unknown age that intruded metasedimentary rocks of the Neoproterozoic Oortsog Formation. The lithium mineralized dikes have a thickness between 0.5-1.5 m and a length between 100-200 m.

Samples from the NWO consist of albite, quartz, topaz, beryl, spodumene, lepidolite, and muscovite with minor petalite, elbaite, and K-feldspar, as well as accessory apatite, cassiterite, columbite-tantalite, and fluorite. Secondary lepidolite occurs along the margins of spodumene and lepidolite grains. Samples from the KHO contain quartz, plagioclase, lepidolite, elbaite, and topaz with accessory monazite, cassiterite, columbite-tantalite, zircon, fluorite, and apatite. Secondary lepidolite with symplectitic texture is abundant.

Cassiterite U-Pb analysis for the NWO yielded 497±8 Ma while monazite U-Th-Pb analysis for the KHO yielded 504.5±5.5 Ma, indicating that the KHO and NWO formed around the same time. The minimum lepidolite Ar-Ar age for the NWO is defined to be 360 Ma whereas lepidolite Ar-Ar age for the KHO is determined as 426.1±1 Ma, indicating that the lepidolite Ar-Ar ages for both occurrences were reset due to later events based on the secondary textures.

These age results indicate that the LCT pegmatites formed in a collisional setting wherein the Paleo-Asian Ocean subducted underneath the Central Mongolia-Amuria block and possibly derived from the crystalline basement of the Idermeg terrane.