

Spodumene pegmatite resource potential of Austria

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Pegmatites are widespread in the Austroalpine basement units of the Eastern Alps. Some formed during the Varican or Alpine collisional events, but most developed during Permian lithospheric extension. Spodumene is present in anatectic Permian pegmatites only. To date, some 80 spodumene bearing pegmatite occurrences are known in Austria. Just a few other Li bearing minerals like liddicoatite, ferrisicklerite, triphylite, and holmquistite are found in trace amounts in these pegmatites. Minerals like petalite, eucryptite, amblygonite, lepidolite being substantial components of economically important deposits elsewhere in the world are absent. Whole rock geochemistry of spodumene pegmatites gives a range between 0.1 and ca. 2.5 wt.-% of Li_2O . Most of the spodumene pegmatites are zoned. Usually the outer zones contain no spodumene. Inner zones show variable grades of 30 vol.-% of spodumene at maximum. Many dykes of the biggest deposit in Austria, situated at Weinebene, are strongly sheared and can be termed mylonites comprising no megascopically visible zonation at all. At the Weinebene deposit, 15 individual spodumene pegmatite dikes have been discovered and 12.88 mt of ore resources grading 1 wt.-% Li_2O were documented until now. There is great unexplored potential at depth and in the dikes' strike direction. For the delineation of provinces with highly evolved pegmatites more than 1,200 muscovites of different pegmatites were analysed by LA-ICP-MS. Ratios of K/Rb, K/Tl, K/Cs in micas are good indicators for the degree of fractionation of a pegmatite dike. Spodumene pegmatite muscovites show K/Rb-ratios of less than 100. In the neighbouring areas of spodumene pegmatites, muscovites of several barren pegmatites usually contain elevated concentrations of Rb resulting in low K/Rb ratios. The pegmatite muscovite K/Rb distribution gives confidence for new discoveries of spodumene pegmatites in underexplored areas like the central part of the Deferegggen valley or the southern part of the Koralpe and others. Spodumene pegmatites are known from areas near Anger, St. Radegund, southern slope of the Gleinalpe, central part of Koralpe, Wölz Tauern, Falkenberg, Hüttenberg, Millstatt Seerücken, Kreuzeck Mountains, and Deferegggen valley. Permian spodumene pegmatites are also reported from Southern Tyrol in comparable geological units. Most of these deposits have drawbacks for mining because of alternative land uses, environmental protection, civilization nearby and others. Besides the Weinebene deposit, the most promising potential for mineable spodumene is considered at the Millstatt Seerücken and the Deferegggen valley. Valuable by-products could be quartz, feldspar and muscovite. In all investigated spodumene pegmatites beryl, Nb-Ta minerals, as well as cassiterite are too scarce to contribute to an economically feasible mining operation.