MAGMATIC STAUROLITE IN A PEGMATITE FROM THE TEXEL COMPLEX, SOUTHERN TYROL – EVIDENCE FOR ANATECTIC FORMATION OF BERYL-COLTAN PEGMATITES IN THE AUSTROALPINE BASEMENT OF THE EASTERN ALPS

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A pegmatite field was studied in the Texel Complex of the Austroalpine Basement, Southern Tyrol, between Val Passiria and Val Racines. It contains pegmatites with Be-Nb-Ta-Sn-U mineralizations with various degrees of differentiation embedded in amphibolite-facies garnet ± staurolite ± kyanite ± paragonite-bearing gneisses or calcite-dolomite marbles. One of the pegmatites contains an unusually diverse assemblage quartz + muscovite + paragonite + albite + accessory garnet + beryl + apatite + zircon + cassiterite + Nb-Ta-rutile + ixiolite-wodginite + columbite-tantalite + tapiolite + U-microlite + cheralite + thorite + uraninite + wyllieite + arrojadite. Tourmaline and K-feldspar are notably absent. HfO_2 contents of up to 13.5 wt% in zircon and Rb and Cs contents of up to 965 ppm and 9700 ppm, respectively, in muscovite indicate a high degree of differentiation. Single grain U-Pb dating of zircon yields 240 Ma consistent with a formation during the Permian metamorphic event (SCHUSTER & STÜWE, 2008). Beryl appears as idiomorphic crystals of up to several cm in length and contains an Al-rich inclusion assemblage with chrysoberyl + staurolite + Zn-spinel + Be-cordierite. Staurolites form perfectly idiomorphic crystals up to 50 x 20 μm which are always intergrown with quartz. They are Fe-rich (X_{Fe}=0.88-0.98) and contain variable ZnO contents in the range 0.7-3.7 wt%. Textures of the staurolites and the mode of occurrence as inclusions in beryl indicate a magmatic crystallization from a fluid-saturated melt. To test a possible origin of the staurolite by partial melting of the metapelitic country rocks, experiments at 7 kbar and 700-750 °C were conducted using a garnet-staurolite-paragonite gneiss from the vicinity of the pegmatite as starting material. Preliminary results show that staurolite indeed is stable coexisting with granitic melt at 700 and 750 °C under both water-absent and water present conditions. These results are consistent with those from melting experiments by GARCIA-CASCO et al. (2003) and show that staurolite may be stable as magmatic phase during anatexis of Fe-rich metapelites. In summary both textural and experimental evidence supports an origin of the investigated pegmatites by anatexis of the country rocks during the Permian metamorphic event at T ≥ 700-750 °C. This mode of pegmatite formation dispenses with the necessity of a genetic association with a granitic intrusive body. The absence of such associated intrusions is a characteristic feature of rare metal-bearing pegmatites of the Eastern Alpine basement (MALI, 2004).