ANDROSITE-(Ce) AND FERRIANDROSITE-(Ce) AS INDICATOR FOR LOW-GRADE REE MOBILITY IN THE VEITSCH MN DEPOSIT (STYRIA)

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Several carbonate-hosted Fe and Mn ore deposits occur within the upper Austroalpine Grewywacke Zone. The Mn deposit of Veitsch at the Kaskogel and north of the Friedelkogel consists of lense-shaped carbonate bodies of ca. 1.5 m in length which are thought to have formed as sedimentary or submarine hydrothermal Mn-deposits. The manganese silicates described from this deposit are: tephroite, rhodonite, spessartine, Mn-chlorite, sonolite and friedelite. The Mn-carbonates are rhodochrosite and kutnahorite. Sulfides such as sphalerite, galena, chalcopyrite, Co-pentlandite, linnaeite, carrollite, cobaltite and pyrite also occur.
During this investigation in several samples unusual REE-Mn-(V)-bearing minerals of the allanite subgroup were found. The allanite occurs in a veinlet with the mineral assemblage REE-Mn-allanite + tephroite + spessartine + Mn-chlorite + rhodochrosite + kutnahorite + serpentine. The REE-content varies between 0.6 and 1.0 a.p.f.u. in which Ce dominates, and Mn ranges from 1.0 to 1.6 a.p.f.u. In one sample elevated V contents of 0.8-7.3 wt.% V_2O_3 were observed. The BSE images and chemical analysis reveal a complex zoning of the mineral with increasing Fe_2O_3, MnO and decreasing Al_2O_3 and CaO towards the rim, whereas the REE are unzoned except for V-bearing areas. In addition, it is planned to conduct laser-ICP MS analysis of the zoned crystals to obtain the full spectrum of trace elements of these rare minerals. Charge balance considerations and site assignments indicate that the fraction of Mn^{3+} is very low (<0.2 a.p.f.u.). In terms of nomenclature, ARMBRUSTER et al. (2006) suggest that the dominant cations on the A1 and M3 sites are responsible for the correct root name, thus the names ferriandrosite-(Ce) (Mn^{2+} REE Fe^{3+} Al Mn^{2+} $(SiO_4)_3$ OH) and androsite-(Ce) (Mn^{2+} REE Al Al Mn^{2+} $(SiO_4)_3$ OH) should be used. For three other occuring compositions (Ca^{2+} REE Fe^{3+} Al Mn^{2+} $(SiO_4)_3$ OH), (Ca^{2+} REE Al Al Mn^{2+} $(SiO_4)_3$ OH) and (Ca^{2+} REE V^{3+} Al Mn^{2+} $(SiO_4)_3$ OH), where Ca occupies the A1 site, an additional root name, which is not specified yet, is required. On the other hand, BONAZZI et al. (2009) observed similar compositions like in this study and named the composition (Ca^{2+} REE Fe^{3+} Al Mn^{2+} $(SiO_4)_3$ OH) a „relation to ferriallanite-(Ce) along the substitutional vector $^{M3}(Mn^{2+}) \rightarrow {}^{M3}(Fe^{2+})$"
Textural observation indicates that these REE-bearing minerals formed along veins during low-grade (Eo-Alpine greenschist-facies) REE mobility in these Mn-carbonates.

ARMBRUSTER, T., BONAZZI, P., AKASAKA, M, BERMANEK, V., CHOPIN, C., GIERÉ, R., HEUSS-ASSBICHLER, S., LIEBSCHER, A, MENCHETTI, S., PAN; Y., PASERO, M. (2006): Eur. J. Mineral., 18, 551-567.

BONAZZI, P., HOLTSTAM, D., BINDI, L., NYSTEN, P., CAPITANI, G. (2009): American Mineralogist, 94, 121-134.