American Mineralogist, Volume 90, pages 1177–1185, 2005

Dissakisite-(La) from the Ulten zone peridotite (Italian Eastern Alps): A new end-member of the epidote group

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ABSTRACT

Dissakisite-(La), ideally $CaLaAl_2MgSi_3O_{12}(OH)$, has been found in the Hochwart peridotite, Ulten zone, Italy. The mineral occurs as centimeter-sized black to very dark brown anhedral nodules and smaller grains. Associated minerals are: olivine, spinel, amphiboles, clino- and orthopyroxenes, and minor clinochlore, uraninite, thorite, thorianite, phlogopite, zircon, apatite, calcite, dolomite, pentlandite, and copper sulfides. The streak is gray-greenish and the luster is vitreous. Mohs hardness is 6.5–7; the mineral is brittle with a conchoidal fracture. The cleavage is imperfect on (001). Dissakisite-(La) is monoclinic, space group $P2_1/m$. The unit cell dimensions are $a = 8.9616(7)$, $b = 5.7265(5)$, and $c = 10.2353(9)$ Å, $\beta = 115.193(6)°$, $V = 475.30(7)$ Å^3, $Z = 2$. The strongest X-ray powder diffraction lines are: [d(Å) (I)(hkl)] 2.926(100)(11$\bar{3}$), 2.860(53)(020), 2.553(51)(202), 3.526(49)(21$\bar{1}$), 2.699(44)(120). Electron and ion microprobe analysis of the type sample DISS 5 gave the formula $(Ca_{1.195}Mn_{0.009}Sr_{0.010}Na_{0.002}Th_{0.090}U_{0.003}La_{0.315}Ce_{0.262}Pr_{0.019}Nd_{0.038}Sm_{0.002}Gd_{0.001}Er_{0.001})(Al_{1.816}Mg_{0.622}Fe^{2+}_{0.244}Fe^{3+}_{0.159}Cr_{0.148}Ti_{0.030}Sc_{0.002}V_{0.008}Ga_{0.001}Ni_{0.010}Zn_{0.015})(Si_{2.970}Al_{0.022}P_{0.008})O_{11.991}F_{0.009}(OH)$. The La/(La + Ce) ratio is 0.545(16) in the type analysis and 0.543(18) in an average of 70 analyses of the type sample A4310. Ce ≥ La was not observed in any analysis. $D_{meas} = 3.79(15)$ g/cm^3; $D_{calc} = 3.84$ g/cm^3. Radioactivity is appreciable. The optical properties and Raman spectrometry have also been investigated. The mineral formed by hydration and enrichment in LILE and LREE of a peridotite body, in relation to H*P*-migmatization of the surrounding gneisses during the Variscan orogeny.