New Mineral Names*

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AGARDITE—(Ce)*


The mineral occurs as light green to yellowish green acicular crystals, up to 0.5 mm long and 0.01 mm thick, commonly in radial aggregates. Electron microprobe analysis gave CaO 1.21, CuO 42.91, Fe2O3 0.39, Ce2O3 4.99, La2O3 2.32, Nd2O3 2.38, Sm2O3 0.56, Gd2O3 0.52, Eu2O3 0.26, Dy2O3 0.18, Y2O3 0.91, As2O5 30.91, SO3 0.40, SiO2 0.96, H2O (by difference) 11.10, sum 100 wt%, corresponding to (Ce0.03Ca0.23La0.15Nd0.15Y0.06Sm0.03Gd0.002Eu0.002Dy0.002)2(As0.78Fe0.03)2.60(Si0.91O1.90)2H2O for 12 O and 6 (OH), ideally CeCu2(AsO4)(OH)·3H2O, which is the Ce-dominant analog of agardite-(La) and agardite-(Y). Vitreous to silky luster, transparent to translucent, greenish to pale yellow streak, H = 3, no cleavage, conchoidal fracture, forms {100} and {001}, Dmeas = 3.70(5), Dcalc = 3.775 g/cm³ for Z = 2, easily soluble in HCl and HNO3. Optically uniaxial positive, ω = 1.725(3), ε = 1.810(3), pleochroism O = yellowish green, E = green. Indexing of the X-ray powder pattern (57 mm camera, FeKα radiation) gave α = 13.59(2), c = 5.89(1) Å, hexagonal space group P6/mc by analogy with other members of the mixite group. Strongest lines of the powder pattern are 11.88(100,100), 4.47(80,111,120), 3.56(80,211), 2.95(80,002,221,400), and 2.46(90,212,321).

The mineral is associated with goethite and cornwallite as oxidation products that formed on barite and quartz at the Clara volcano lava field near Ettringen, 2 km north of Mayen, Laacher See region, Eifel, Germany. Associated minerals are tridymite, sandine, clinoxyroxene, amphibole, quartz, hematite, and braunite. The new mineral name is from Alma Mater Rudolphina, the proper name for the Universität Wien. Type material is in the Naturhistorisches Museum Wien, Vienna, Austria.

Discussion. The mineral is the Mn-dominant analog of milarite, but structural study found no evidence for significant H2O, the absence of which is common in other members of the osmiumite group. E.S.G.

ALMARUDITE*


* Before publication, minerals marked with an asterisk were approved by the Commission on New Minerals and Mineral Names, International Mineralogical Association.
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ALUMINO-MAGNESIOHULSITE*


The mineral forms euhedral to subhedral prisms up to 90 μm long parallel to h. Electron microprobe analyses (average of 4) gave TiO2 0.75, SnO2 11.88, B2O3 17.07 (calculated from stoichiometry), Al2O3 15.86, MgO 33.94, CaO 0.11, MnO 0.42, FeO 15.97, sum 96.00 wt%, corresponding to (Mg1.53Fe2.47)Σ2.92 (Al0.61Mg0.61Mn0.05)Ti0.02Sn0.16O2.99(BO3), ideally Mg2(Al1-2x, Fe2-x)}
Mg$_3$Sn$_2$O$_7$(BO$_3$) for 5 O. Transparent, blue-green to brown in thin section, $D_{calc}$ = 3.84 g/cm$^3$ for Z = 2, twin lamellae parallel to {h0l}. Optically biaxial positive, $a' = 1.78$, $g' = 1.805$ from reflectance data at $\lambda$ = 546 nm, $2V_{max}$ = 33(5)$^\circ$. Pleochroism strong, $X$ = brown, $Y$ = brown, $Z$ = blue-green, orientation $X$ = b. X-ray structure study ($R_b$ = 0.0617) gave monoclinic symmetry, space group $P2_1/m$, $a = 5.3444(7)$, $b = 3.0300(5)$, $c = 10.506(1)$ Å, $\beta = 94.46(1)^\circ$, $V = 169.29(4)$ Å$^3$. No powder pattern given.

The mineral occurs in Paleozoic kotoite marble in the contact zone of a Mesozoic granosyenite massif near the mouth of Kebir’in’ya Creek, a northern tributary of the Dogdo River (~67.5° N, ~139° E), some 250 km east of Verkhoyansk, Republic of Sakha-Yakutia, Russia. The mineral is almost always intergrown with ludwigite; other associated minerals are calcite, spinel, löllingite, pertsevite, clinohumite, and forsterite; saizelyite and brucite are secondary after kotoite. The new mineral name is for the composition and relationship to hulsite. Type material is in the Mineralogical Collection of the Institut für Geologie, Mineralogie und Geophysik, Ruhr-Universität Bochum, Germany.

Discussion. The recognition of the mineral as a distinct species in the hulsite group is based on the formula (MI)$_2$(MII)$_{2}$BO$_3$ (Alekseev et al., Geochem. Internat., 38, 772–787, 2000) wherein MI is Fe$^{2+}$ and Mg, and wherein MII includes all other cations, as well as Mg or Fe$^{2+}$ not accommodated in MI, so that the average valence for MII is +3. For aluminomagnesiohulsite, Mg > Fe in MI, and Al is the most abundant cation in MII. The mineral was accepted by CNMMN IMA on these purely stoichiometric criteria.

As discussed by the authors, recognition of mineral species in the hulsite group could be based on a structural formula, MI$^{2+}$,MI$^{2+}$BO$_3$, wherein MI$'$ corresponds to the M4 and M5 sites, and MI$''$ corresponds to the M1, M2, and M3 sites, for which the average valence of MI$'$ is 2.25. This would allow definition of proper end-member compositions as advocated by Hawthorne (Can. Mineral., 40, 699–710, 2002), an approach consistent with the usual CNMMN IMA criteria for distinguishing species on the basis of site occupancy (Table 1). That is, aluminomagnesiohulsite is distinct from magnesiomagnesiohulsite because Al is the most abundant cation at M1, M2, and M3 taken together, Al$_{0.65}$Mg$_{0.35}$Fe$_{0.1}$Sn$_{0.18}$, and the end-member [Mg$_{1.5}$,(AlMg$_{0.7}$)$_{1.5}$]$O_{3.5}$BO$_3$] is the dominant component. Tin seems to be an essential constituent of hulsite-group minerals.

“Stanno-magnesiohulsite,” potentially a distinct mineral species, is the dominant component in two compositions reported by Aleksandrov et al. (op. cit.). E.S.G.

**Table 1. Members of the hulsite group**

<table>
<thead>
<tr>
<th>Mineral</th>
<th>MI$'$</th>
<th>MI$''$</th>
<th>End-member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hulsite</td>
<td>Fe$^{2+}$&gt;Mg</td>
<td>Fe$^{2+}$&gt;Sn &gt;Mg</td>
<td>Fe$_2^2$(BO$_3$)$_2$</td>
</tr>
<tr>
<td>Magnesiohulsite</td>
<td>Mg&gt;Fe$^{2+}$</td>
<td>Fe$^{2+}$&gt;Mg&gt;Fe$^{2+}$</td>
<td>Mg$<em>{1.5}$(Fe$^{2+}$Mg)$</em>{1.5}$BO$_3$</td>
</tr>
</tbody>
</table>
| Alumino-
| magnesiohulsite | Mg>Fe$^{2+}$ | Mg>Fe$^{2+}$>Sn | Mg$_{1.5}$(Fe$^{2+}$Mg)$_{1.5}$BO$_3$ |
| “Stanno-
| magnesiohulsite” | Mg>Fe$^{2+}$ | Mg>Sn | Mg$_{1.5}$(Sn$_{0.18}$Mg)$_{1.5}$BO$_3$ |

K-DOMINANT AMPHIBOLES


New analyses and a review of high-quality published analyses of the amphibole group reveal that, in addition to the seven approved species for which K is the dominant A-site cation, 14 others correspond to new end-members. In accordance with the nomenclature system in place, the as-yet-unapproved new minerals would be “potassichastingsite,” “potassic-chlorohastingsite,” “potassic-ferropargasite,” “potassic-chloro-ferropargasite,” “potassic-aluminosadanagaite,” “potassic-chlorosadanagaite,” “potassic-chloro-ferro-edenite,” “potassicrichterite,” “potassic-richterite,” “potassic-fluoro-magnesiokataphorite,” “potassic-ferritaramite,” “potassi-magnesio-arvedsonite,” “potassic-fluoro-magnesio-arvedsonite,” and “potassikiorinite,” J.L.J.

**ANSERMETITE**


The mineral forms crusts up to ~500 μm thick and several square centimeters in area; rare single crystals up to 100 μm across have a monoclinic habit. Electron microprobe analysis (average of 8 and recalculated to 100% because of dehydration under microprobe beam) gave V$_2$O$_5$, 53.80, As$_2$O$_3$, 0.44, MnO 20.85, SrO 0.14, H$_2$O 24.77 (calc., from stoichiometry on the basis of crystal-structure refinement), sum 100 wt%, corresponding to (Mn$_{0.59}$Sr$_{0.04}$)$_{2.02}$V$_{1.98}$As$_{0.013}$O$_{24.75}$H$_2$O, ideally Mn$_3$V$_2$O$_7$·4H$_2$O for 8 O and 4 H. Crusts are “bordeaux”-colored, single crystals are carmine red, transparent, streak orange, brittle, H = 3, good {110} cleavage, fracture uneven, adamantine, non-fluorescent, brown, X$_{min}$ = 1.797, X$_{max}$ = 1.856 at $\lambda$ = 589 nm, strong yellow-orange ($\lambda$) to ruby-red (Z) pleochroism. X-ray structure study ($R_b$ = 0.0701) gave monoclinic symmetry, space group C2/c, $a = 13.171(2)$, $b = 10.1280(10)$, $c = 6.9830(10)$ Å, $\beta = 111.572(2)^\circ$. Strongest lines in a powder pattern (17 lines, FeK$_a$ radiation, 114 mm Gandolfi camera) are 7.82(100,110), 5.69(20,111), 5.06(20,020), 4.51(30,111), 3.91(30,220,311), and 3.02(70,131,312).

The mineral fills thin fractures in a Fe-Mn deposit of synsedimentary to diagenetic origin in Triassic carbonates at the Fianel mine near Asserfererra, Ferrara Valley, Canton Graubünden, Switzerland. Associated minerals in the fractures are fainelite and Fe oxyhydroxides; minerals in veinlets cut by the fractures are quartz, aegirine, rhodonite, palenzonaite, saneroite, and Fe oxyhydroxides; minerals in veinlets cut by the fractures are quartz, aegirine, rhodonite, palenzonaite, saneroite, and pyroboelite. The new mineral name is for Stefan Ansermet (b. 1964), Swiss mineralogist specializing in Alpine minerals. Holotype material is in the Musée Géologique Cantonal, Lausanne, Switzerland.

Discussion. The mineral is isotypic with synthetic Mn$_3$V$_2$O$_7$·4H$_2$O, which was prepared hydrothermally at atmospheric pressure (J.H. Liao et al. 1996; Chem. Abs. 125: 74536a). E.S.G.

**FLUORVESUVIANITE**

S.N. Britvin, A.A. Antovov, S.V. Kirovich, T. Armbruster, P.C. Burns, N.V. Chukanov (2003) Fluorvesuvianite, Ca$_{47}$(Al,Mg,
Fe\(^{2+}\), \(\text{SiO}_3\), \(\text{Si}_2\text{O}_5\), \(\text{O}(\text{F},\text{OH})\), a new mineral species from Pitkäkanka, Karelia, Russia: description and crystal structure. Can. Mineral., 41, 1371–1380.

The mineral forms radiating aggregates of acicular crystals, 5–30 μm thick and up to 1.5 cm long; the faces are probably \{100\} and \{110\}. Electron microprobe analyses (average of 4) gave SiO\(_2\): 36.6, Al\(_2\)O\(_3\): 17.9, MgO 1.9, FeO 2.8, MnO 0.1, CaO 36.1, F (ion-selective electrode) 4.6, H\(_2\)O (TGA) 0.5, F = O 1.94, sum 98.56 wt\%, corresponding to Ca\(_{10}\){\(\text{Mg}_{3.13}\text{Fe}_{2.35}\)\(\text{Mn}_{0.04}\)\(\text{Si}_{2.19}\)\(\text{O}_{12}\)\(\text{F}_{0.06}\)\(\text{OH}_{0.04}\)\(\text{O}_{2.20}\)} for 50 cations, ideally Ca\(_{9.36}\){\(\text{Al}_{0.59}\text{Mg}_{0.24}\)\(\text{Fe}_{3.07}\)\(\text{Si}_{5.21}\)\(\text{O}_{12}\)\(\text{F}_{0.06}\)\(\text{OH}_{0.05}\)\(\text{O}_{2.23}\)} for 50 anionic charges. Transparent, colorless, streak presumably white, brittle, \(H = 6\), no cleavage, vitreous silky luster, nonfluorescent, \(D_{\text{calc}} = 3.46(3)\), \(D_{\text{meas}} = 3.40\) g/cm\(^3\) for \(Z = 2\). Optically uniaxial negative, \(\alpha = 1.702(1), \beta = 1.699(1)\) at \(\lambda = 589\) nm. X-ray structure study \((R_i = 0.043)\) gave tetragonal symmetry, space group \(P4/nmc\), \(a = 15.5295(10), c = 11.7808(11)\) Å. Strongest lines in a powder pattern (65 lines, Cu\(K\alpha\) radiation, diffractometer): 2.7425(77,313), 2.7146(32,512), 2.4737(94,114), 2.4178(32,513), 2.4137(46,711), 2.2409(100,414), 2.2344(49,810), 1.7081(92,424), 1.7053(44,820), and 1.4806(41,120).

The mineral occurs in Paleozoic kotoite marble in the contact zone of a Mesozoic granosyenite massif near the mouth of Kebir'in'ya Creek, a northern tributary of the Dogdo River (−67°5′ N, −139° E), some 250 km east of Verkhoyansk, Republic of Sakha-Yakutia, Russia. The mineral replaced clinohumite and forsterite; other associated minerals are calcite, spinel, lollingite, ludwigite, and alunino-magnesiohlusite; saibalyte and brucite are secondary after kotoite. The new mineral name is for Nikolai Nikolayevich Pertsev, Russian mineralogist specializing in boron minerals and deposits. Type material is in the Mineralogical Collection of the Institut für Geologie, Mineralogie und Geophysik, Ruhr-Universität Bochum, Germany.

Discussion. The mineral contains 9–27 mol\% (Mg, Fe)\text{Si}_4\text{O}_{10} and is isomorphous with synthetic α-Mg\text{BO}_3\text{F}, but shows no evidence for the \((\text{F}) = (\text{BO}_3)\) substitution reported in the synthetic compound (Grigor'ev and Brovkin, 1969, Doklady Akad. Nauk, 186, 1387–1390; Brovkin and Nikishova, 1975, Sov. Phys. Crystallogr., 20, 452–455). E.S.G.

**Rondorfite**

T. Mihajliovčič, C.L. Lengauer, T. Ntaflos, U. Kolitsch, E. Tillmanns (2004) Two new minerals, rondorfite, Ca\(_3\){\(\text{MgSi}_4\)\(\text{Cl}_2\)}\text{Cl}_2, and almarudite, K\(_2\){\(\text{Al}\)\(_3\)\(\text{MnFe}_2\)\(\text{BeAl}\)\(_2\)\(\text{Si}_7\)\(\text{O}_{16}\)}\text{Cl}_2, and a study of iron-rich wadalite, Ca\(_3\){\(\text{AlSi}_3\)\(\text{Fe}_2\)\(\text{O}_6\)\(\text{Cl}_2\)}\text{Cl}_2, from the Bellerberg (Bellberg) volcano, Eifel, Germany. Neues Jahrb. Mineral. Abh., 179, 265–294.

The mineral forms anhedral grains up to 0.3 mm in diameter. Electron microprobe analysis (average of 8) gave SiO\(_2\): 50.31, TiO\(_2\): 0.13, Al\(_2\)O\(_3\): 0.40, MgO 4.52, FeO 0.54, CaO 57.05, Na\(_2\)O 0.07, Cl (corrected for Cl = O) 6.71, sum 99.93 wt\%, corresponding to \((\text{Ca}_{9.36}\text{Na}_{0.02}\text{Fe}_{0.08}\text{Al}_{0.08}\text{Mn}_{0.06}\text{Si}_{2.18}\text{O}_{12}\)\(\text{OH}_{0.04}\)\(\text{Cl}_{0.06}\)) for 34 anionic charges. Color orange-brown to amber, transparent, streak light amber, brittle, no cleavage, fracture conchoidal, luster vitreous, \(D_{\text{calc}} = 3.034\) g/cm\(^3\) for \(Z = 8\). Optically isotropic, \(n = 1.676(1)\) at \(\lambda = 589\) nm. X-ray structure study \((R_i = 0.0231)\) gave isometric symmetry, space group \(Fd\beta\), \(a = 15.0850(3)\) Å. Strongest lines in a powder pattern (28 lines, Cu\(K\alpha\) radiation, 114 mm Gandolfi camera): 2.901(40,511), 2.666(100,440), 2.549(30,531), 1.964(30,553), 1.885(30,800), 1.777(30,822), 1.540(50,844), and 1.459(30,951).

The mineral occurs in metasomatized limestone xenoliths in Quaternary leucite tephritic lava in a quarry at the Bellerberg volcano lava field near Ettringen, 2 km north of Mayen, Laacher See region, Eifel, Germany. The mineral is intergrown with Ca\(_3\){\(\text{Si}_4\)\(\text{O}_{10}\)}\text{H}_2\text{O} in association with ettringite–thaumasite, mayenite, tennsite, cuspidine, larnite, “calcio–olivine,” tobermorite, portlandite, hydroxalcumite, a member of the elладseite series, carbonate, quartz, magnetite and hematite. The new mineral name is for Alice and Eugen Rondorf, mineral collectors. Type material is in the Naturhistorisches Museum Wien, Vienna, Austria.

Discussion. A compound corresponding to this mineral was synthesized by Von Lampe et al. (1986, Chem. Abs., 105:
Optically biaxial. Electron- and ion-probe analyses for SFFP (sodic-ferri-ferropedrizite) and FCFH (ferri-clinoferroholmquistite) gave, respectively, SiO$_2$ 56.25, 56.11, TiO$_2$ 1.19, 0.07, Al$_2$O$_3$ 1.24, 1.51, FeO$_2$ 13.92, 15.63, FeO 13.04, 12.98, MnO 0.60, 1.14, MgO 4.48, 5.04, ZnO 0.15, 0.21, Li$_2$O 4.20, 3.80, CaO 0.20, 0.13, Na$_2$O 0.24, 1.29, K$_2$O 0.17, 0.01, F 1.15, 0.54, H$_2$O 1.53, 1.88, O = 0.48, 0.23, sum 100.11, 100.11 wt%, which for 24(O,OH,F) and 8 Si correspond to (Na$_{0.85}$K$_{0.05}$)$_2$Na$_{0.15}$Li$_{0.05}$Mg$_{0.1}$Fe$_{1.85}$Ti$_{0.15}$Al$_{0.5}$Mn$_{0.15}$O$_{2}$, which for 24(O,OH,F) and 8 Si correspond to (Na$_{0.85}$K$_{0.05}$)$_2$Na$_{0.15}$Li$_{0.05}$Mg$_{0.1}$Fe$_{1.85}$Ti$_{0.15}$Al$_{0.5}$Mn$_{0.15}$O$_{2}$. Single-crystal X-ray structure study of SFFP and FCFH (R = 0.016, 0.022) gave monoclinic symmetry, space group C2/m, a = 9.496(4), b = 17.883(8), c = 5.297(2) Å, β = 102.06(3)°, and a = 9.466(4), b = 17.898(9), c = 5.302(3) Å, β = 101.88(4)°. Strongest lines of the calculated powder pattern for SFFP are 8.241(100,110), 4.471(33,040), 3.416(39,131), 3.050(60,310), 2.714(72,151), and 2.494(36,202); those for FCFH are 8.224(100,110), 4.474(30,040), 3.420(30,131), 3.042(54,310), 2.717(69,151), and 2.492(32,202). The new minerals are from the Arroyo de la Yedra valley in the eastern sector of the Pedriza massif, Sierra de Guadarrama, Spain. The new mineral names conform with the CNMNN-approved nomenclature system for the amphibole group. Type material is in the Museo di Mineralogia, Dipartimento di Scienze della Terra, Università degli Studi di Pavia, Italy. J.L.L.

**TELYUSHENKOITE**


The mineral occurs as white to colorless equant anhedral grains up to 2 cm across. Electron microprobe analysis gave Na$_2$O 13.53, K$_2$O 0.47, Cs$_2$O 6.76, Rb$_2$O 0.15, BeO (colorimetric) 3.53, ZnO 1.71, Al$_2$O$_3$ 7.26, SiO$_2$ 64.32, F 2.84, O = F 1.20, sum 99.37 wt%, corresponding to (Cs$_{0.9}$Be$_{0.1}$)K$_2$F$_2$Rb$_2$Sb$_{0.4}$F$_{1.7}$O$_{2}$F$_{2.6}$ generalization as in the first title. Vitreous luster, transparent, white streak, distinct cleavage, $\alpha$ = 1.526(2), $\beta$ = 1.531(2). The IR spectrum is similar to that of leifite but differs in the absence of bands for OH and H$_2$O. Single-crystal X-ray structure study (R = 0.024) indicated trigonal symmetry, space group $P\bar{3}$m1, $a = 14.377(0)$, $c = 4.8786(3)$ Å. Strongest lines of the X-ray powder pattern (diffractometer, FeK$\alpha$ radiation) are 6.226(35,020), 4.149(50,030), 3.456(40,130), 3.382(75,121), 3.162(100,031), and 3.113(36,040).

The new mineral, which is the Cs-dominant analog of leifite, is associated with redmergerinite, microcline, pectolite, hya-

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SODIC-FERRI-FERROPEDRIZITE, FERRI-CLINOFERROHOLMQUISTITE


The two new amphiboles occur in an episyenite that was formed by desilication and albitionization of a cordierite-bearing porphyritic granite. Both minerals form intergranular granoblastic aggregates of subhedral to euhedral grains associated with albite and pyroxene, or occur as inclusions in albite, quartz, and titanite. Black color, vitreous luster, brittle, gray streak, uneven fracture, {110} cleavage, twinning not observed, nonfluorescent.
loketite, shibkovite, nordite-(Ce), leucophanite, kentbrooksite, polylicthionite, and albite in moraine boulders of the Dara-i-Pioz glacier, South Tien-Shan Mountains, Tajikistan. The reedmegerite forms grains up to 15 cm in diameter and makes up 85–90% of the rock. The new mineral name is for petrographer and teacher Tamara M. Telyushenko (1930–1997). Type material is in the Fersman Mineralogical Museum, Moscow, Russia. Published chemical data indicate that the K-dominant analog also exists but has not been described as a new species. J.L.J.

ZINCONIGERITE-6/νS

The mineral forms golden-brown hexagonal plates, roughly 0.5–1 mm in diameter. Electron microprobe analysis (average of 23) of material from the type locality of nigerite gave SiO$_2$ 0.05, TiO$_2$ 1.51, SnO$_2$ 18.63, Al$_2$O$_3$ 54.13, Cr$_2$O$_3$ 0.01, FeO 9.76, MgO 0.74, MnO 0.17, ZnO 11.81, NiO 0.01, CoO 0.02, Li$_2$O (ion microprobe) 0.61, [H$_2$O (calc.) 1.28], sum 98.72 wt%, corresponding to Sn$_{1.7}$Ti$_{0.05}$Li$_{0.75}$Zn$_{13.1}$Fe$_{2.7}$Mn$_{10.12}$(Al$_{4.48}$Mg$_{0.52}$)Z$_{12.60}$O$_{45}$(OH)$_{2}$ for Z = 90 and OH = 6. X-ray structure study (R$_{1}$ = 0.0201) gave hexagonal symmetry, space group R3m, a = 5.716(1), c = 55.444(8) Å.

The mineral occurs in sillimanite–quartz rocks in the Egbe district, Kabba Province, Nigeria (type locality for nigerite) and in the tin mine of Tsomtsamba, between Omarusu and Us, Namibia. At the type locality, the mineral is intergrown with garnite and the host rock is associated with casseriterite-bearing pegmatite, whereas the association at the Tsomtsamba mine is with casseriterite, columbite–tantalite, and chrysoberyl. The new mineral indicates the mineral to be the Zn-dominant, 6/νS polysome of the nigerite group. The studied samples are in the Museum of Natural History, Bern, Switzerland.

Discussion. The calculated H$_2$O value has been added (E.S.G.) to the data. It is suggested in the paper that Li is an essential constituent of the -6/νS and -2/νS polysomes of the nigerite group, although only traces of Li estimated spectrographically were reported in the original description of nigerite (Am. Mineral., 33, p. 98, 1948). Zinconigerite-6/νS was not fully characterized as a new species distinct from ferronigerite-6/νS (see Armbruster, Am. Mineral., 88, p. 254–255, 2003) because the Zn/Zn + Fe ratio is only 0.50–0.52 in the studied material, much less than the Zn/Zn + Fe of 0.88 reported in an overgrowth of the 6/νS polysome around garnite from Portugal (Neiva and Champness, Neues Jahrb. Mineral. Monatsh., p. 385–409, 1997). E.S.G.

$$(\text{Ag},\text{Cu})_2\text{Te}_2\text{S}_2, (\text{Ag},\text{Au},\text{Cu})_2\text{Te}_2\text{S}_3$$


The minerals occur as grains up to 13 μm long. One of three listed electron microprobe analyses for the Ag-Cu mineral has Ag 66.16, Cu 6.52, Pb 0.17, Te 22.45, S 4.07, sum 99.37 wt%, corresponding to Ag$_{50.92}$Cu$_{1.39}$Pb$_{0.03}$Te$_{6.60}$S$_{4.33}$, simplified as (Ag,Cu)$_2$Te$_2$S$_3$. One of four listed analyses for the Ag-Au-Cu mineral has Ag 61.42, Au 10.48, Cu 2.15, Pb 0.02, Zn 0.04, Te 18.32, Se 0.11, S 6.87, sum 99.41 wt%, corresponding to Ag$_{23.79}$Au$_{2.25}$Cu$_{1.37}$Zn$_{0.02}$Te$_{0.05}$S$_{8.99}$Se$_{0.06}$, simplified as (Ag,Au,Cu)$_2$Te$_3$S$_3$ or possibly (Ag,Cu)$_2$Au$_2$Te$_2$S$_6$. Both minerals are isometric and have two or three cleavages, a polishing hardness similar to that of altaite, and a reflectance of 30–50%. The Ag-Cu mineral is white with a gray-brownish tint, and coexists with hessite and sylvanite; the Ag-Au-Cu mineral is white with a gray-yellowish tint, and is intergrown with petzite and kostovite. Both of the sulfotellurides also replaced hessite, petzite, tetrahedrite, and goldfieldite. The minerals occur in a stockwork of epithermal quartz veins in the Panamós Bay area of Tinos Island, Greece. J.L.J.

**FeCr$_2$O$_4$, ORTHORHOMBIC**

Shock-produced veinlets in the Suizhou chondrite contain chromite and an adjacent CaTiO$_3$-structured FeCr$_2$O$_4$ polymorph; the intermediate zone between the two was previously interpreted to be zone of complex mutual intergrowth (Am. Mineral., 89, p. 000, 2004), but synchrotron X-ray study of the zone in situ showed it to be another orthorhombic polymorph of FeCr$_2$O$_4$. Indexing of the powder pattern gave a = 8.954(7), b = 2.986(2), c = 9.891(7) Å, space group Pmma, D$_{calc}$ = 5.62 g/cm$^3$ for Z = 4. Of the 20 lines listed, those of strong intensity are 2.656(230), 2.166(240), 2.039(420), 1.660(440), 1.536(501), 1.425(161), and 1.267(142). Both of the orthorhombic polymorphs have been synthesized. J.L.J.

**GD SILICATE, OXIDES**

Results are listed for six normalized microbeam analyses obtained from six particles of lunar regolith, each 500 nm to 5 μm in size. The results are interpreted to correspond to the simplified formulas GdFe$_5^+$Al$_{2}$Si$_{19}$O$_{41}$, Ca$_{1.1}$Gd$_{0.1}$Fe$_{5.9}$Zr$_{0.8}$O$_{16}$, CaGd$_{0.1}$Th$_{0.1}$Ti$_{0.1}$Zr$_{0.1}$, (Gd$_{0.1}$,Th$_{0.1}$)$_{17}$Al$_{0.1}$Ti$_{0.3}$Zr$_{0.1}$O$_{25}$, (Gd$_{0.1}$Ce)$_{0.1}$Zr$_{0.1}$Al$_{0.1}$O$_{25}$, and Gd$_{0.1}$ZrO$_{2}$. A seventh listed analysis of a micrometer-size particle, from the fumarole exhalations of Kudryavyi Volcano on Iturup Island (Kuril Islands) is interpreted to be that of GdTi$_2$O$_5$. J.L.J.