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NEW MINERAL NAMES*

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Afanasyevaite, chesofiite, igumnovite, rhythmite

B.V. Chesnokov (1995) High-temperature chlorosilicate in burned-out mine spoil heaps in the Chelyabinsk coal basin. Doklady Akad. Nauk, 343(1), 94–95 [English translation in Trans. Russ. Acad. Sci., Earth Sci. Sect., 345(8), 104–106, 1996].

Electron microprobe analyses (not given, except for Cl and F) are reported to correspond to the following named compounds. Afanasyevaite is $Ca_8[Si_2O_7]_2 \cdot Cl_2O$, granular habit, pseudocubic; electron microprobe analysis gave 6.19 Cl (calc., 9.35 wt%), 0.85 F, and 0.64 SO_3 wt%. Chesofiite is $Ca_9[Si_2O_7]_3 \cdot CaCl_2$, acicular habit, monoclinic, Cl 7.33, F 0.04 wt%. Igumnovite is $Ca_3Al_2[SiO_4]_2Cl_4$, cubic, Cl 28.25, F 0.13 wt%. Rhythmite is $Ca_4[SiO_4]_2 \cdot 3CaCl_2$, orthorhombic, Cl 31.06, F 0.22 wt%. The compounds were formed by the reaction of mudstone and dolomite, and other carbonate rocks, in burned-out mine wastes from the Kopeysk coal mines in the Chelyabinsk basin, southern Urals, Russia.

Discussion. Additional data and the derivation of the names are not given. The compounds no longer qualify as minerals. **J.L.J.**

Baksanite*

I.V. Pekov, E.N. Zav'yalov, S.V. Fedyushchenko, D.K. Shcherbachev, Yu.S. Borodayev, G.D. Dorokhova (1996) Baksanite, $Bi_6(Te_2S_3)$, a new mineral from Tyrny'auz (northern Caucasus). Doklady Akad. Sci., 347(6), 787–791 (in Russian).

Electron microprobe analysis of several grains that were checked by X-ray powder patterns gave a mean of Bi 76.40, Pb 2.15, Sb 0.12, Te 14.33, Se 0.00, S 6.64, sum 99.64 wt%, corresponding to $(Bi_{5.78}Pb_{0.16}Sb_{0.02})_{\Sigma 5.96}(Te_{1.77}S_{3.27})$. The composition is uniform. The mineral occurs as spherical to droplet-like single grains and aggregates up to 13 mm across; steel-gray color, metallic luster, black streak, perfect basal cleavage, H = 1½–2, VHN_5 = 62 (mean for anisotropic sections), D_{meas} = 8.1(1), D_{calc} = 8.07 g/cm³ for Z = 3. Bright white in reflected light, weak bireflectance, distinctly anisotropic in yellowish gray tints; reflectance percentages, given in 20 nm steps from 400 to 700 nm, range from 46.3–48.5 (R_1, 400 and 700 nm, respectively) and 50.1–51.2 (R_2). Indexing of the X-ray powder pattern indicated trigonal symmetry, space group $P\bar{3}m1$, a = 4.249(2), c = 62.82(5) Å. The X-ray powder pattern (27 lines, diffractometer, Co$K\alpha_1$ radiation) has strongest lines at 4.50(46,00.14), 3.09(100,01.11), 2.255(38,10.22), and 2.126(25,110). The structure has 33 layers per cell.

The mineral occurs among voids in aggregates of andradite, calcite, chlorite, and stilpnomelane in altered magnetite-andradite skarn at the Tyrny'auz W-Mo deposit, Kabardino-Balkaria Republic, Russian Federation. Baksanite contains inclusions of native gold and, rarely, intergrowths of ingodite and joseite-A; all are separated from the host aggregates by a thin lining of bismuthinite. The new name refers to the type locality, the Baksan River valley. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **N.N.P.**

Fougerite

F. Trolard, M. Abdelmoula, G. Bourrié, B. Humbert, J.-M.R. Génin (1996) Evidence of the occurrence of a "green rusts" component in hydromorphic soils. Proposed existence of a new mineral "fougerite." C. Rendu Acad. Sci. Paris, Ser. IIa, 323, 1015–1022 (in French, English abs.).

F. Trolard, J.-M.R. Génin, M. Abdelmoula, G. Bourrié, B. Humbert, A. Herbillon (1997) Identification of a green rust mineral in a reductomorphic soil by Mössbauer and Raman spectroscopies. Geochim. Cosmochim. Acta, 61, 1107–1111.

So-called green rusts are well known synthetically. It has long been assumed that the same, mixed-valence Fe^{2+}-Fe^{3+} compound is responsible for the blue-green colors in sediments and hydromorphic soils that rapidly become ochreous upon exposure to air as a consequence of oxidation of Fe^{2+} and transformation of the blue-green phase to goethite and lepidocrocite. Mössbauer and Raman spectra, and dissolution by citrate-bicarbonate reagent, showed that the natural and synthetic compounds are identical; previous studies had indicated the general formula of the compound to be $[Fe^{2+}_{1-x}Fe^{3+}_x(OH)_2]^{x+} \cdot [\frac{x}{z}A^{-z} \cdot \frac{m}{z}H_2O]^{x-}$, where Fe is in $Fe(OH)_2$ brucite-like layers that alternate with A^{z-} anions and H_2O molecules. The formula can be simplified as $Fe^{2+}Fe^{3+}(OH)_5$. The new name fougerite refers to the locality of the natural sample studied, which was from a soil profile at Fougères, Brittany, France.

Discussion. The authors state that the name fougerite

* 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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has been submitted to the "IMA Committee," but a complete proposal has not been received by the CNMMN. **J.L.J.**

Gallobeudantite*

J.L. Jambor, D.R. Owens, J.D. Grice, M.N. Feinglos (1996) Gallobeudantite, $PbGa_3[(AsO_4),(SO_4)]_2(OH)_6$, a new mineral species from Tsumeb, Namibia, and associated new gallium analogues of the alunite-jarosite family. Can. Mineral., 34, 1305–1315.

One representative electron microprobe analysis (of eight) gave PbO 32.1, ZnO 2.2, Ga_2O_3 19.2, Fe_2O_3 2.9, Al_2O_3 8.9, As_2O_5 16.0, SO_3 10.5, P_2O_5 0.2, GeO_2 0.6, H_2O 8.3 (from stoichiometry and crystal-structure analysis), sum 100.9 wt%, corresponding to $Pb_{1.00}(Ga_{1.43}Al_{1.21}Fe^{3+}_{0.25}Zn_{0.19}Ge_{0.04})_{\Sigma 3.12}[(AsO_4)_{0.96}(SO_4)_{0.91}(PO_4)_{0.02}]_{\Sigma 1.89}(OH)_{6.41}$, ideally $PbGa[(AsO_4),(SO_4)]_2(OH)_6$. This is the Ga analog of beudantite, idealized as $PbFe^{3+}_3[(AsO_4)(SO_4)]_2(OH)_6$. Occurs as zones within rhombohedra, up to 200 μm along an edge, in vugs in a single specimen of Cu-bearing sulfides (renierite, germanite-like, tennantite, and secondary chalcocite). Crystals are variably pale yellow, greenish, or cream-colored; white to pale yellow streak, vitreous luster, even to conchoidal fracture, $H = 4$, transparent, brittle, nonfluorescent, possible {001} cleavage, $D_{calc} = 4.61$ g/cm³ for $Z = 3$. Optically nonpleochroic, uniaxial negative, $\omega = 1.763(5)$, $\epsilon = 1.750(5)$. Single-crystal X-ray structure study ($R = 0.078$) indicated hexagonal (rhombohedral) symmetry, space group $R3m$, $a = 7.225(4)$, $c = 17.03(2)$ Å, isostructural with corkite. Strongest lines of the 114.6 mm Debye–Scherrer powder pattern (Co$K\alpha$ radiation) are 5.85(90)(101), 3.59(40)(110), 3.038(100)(113), and 2.271(40)(107).

The zoned crystals also contain Ga-rich beudantite and hidalgoite, and the unnamed Ga analogs of segnitite, corkite, kintoreite, and arsenocrandallite. In addition, hematite, goethite, stolzite, mercurian silver, and otjisumeite have been identified on the holotype specimen from Tsumeb, Namibia. The name alludes to the predominance of Ga in the position occupied by Fe^{3+} in beudantite-type minerals. Type material (polished section of sulfide-rich matrix and sections of analyzed grains) is in the Systematic Reference Series of the National Mineral Collection, housed at the Geological Survey of Canada, Ottawa. The crystal used for structure determination is in the Canadian Museum of Nature, Ottawa. **A.C.R.**

Kukharenkoite-(Ce)*

A.N. Zaitsev, V.N. Yakovenchuk, G.Y. Chao, R.A. Gault, V.V. Subbotin, Y.A. Pakhomosky, A.N. Bogdanova (1996) Kukharenkoite-(Ce), $Ba_2Ce(CO_3)_3F$, a new mineral from Kola Peninsula, Russia, and Québec, Canada. Eur. J. Mineral., 8, 1327–1336.

The average of 12 electron microprobe analyses gave CaO 0.39, SrO 1.55, BaO 47.39, La_2O_3 6.61, Ce_2O_3 15.30, Pr_2O_3 1.19, Nd_2O_3 4.26, Y_2O_3 0.15, CO_2 (calc.) 21.95, F 3.18, O ≡ F 1.34, sum 100.63 wt%, corresponding to $(Ba_{1.86}Sr_{0.09}Ca_{0.04})_{\Sigma 1.99}(Ce_{0.56}La_{0.24}Nd_{0.15}Pr_{0.04}Y_{0.01})_{\Sigma 1.00}(CO_3)_3F_{1.01}$. Occurs as prismatic, bladed crystals, up to 1.0 mm long, commonly as dendritic or stellate groups, 2–3 mm across. Color yellow, white, or pinkish gray, white streak, transparent, vitreous to greasy luster, cleavage not observed, brittle, uneven fracture, $VHN_{25} = 280(25)$, $H = 4.5$, $D_{meas} = 4.7(1)$, $D_{calc} = 4.62$ g/cm³ for $Z = 2$; effervesces in HCl, nonfluorescent. The infrared spectrum has strong absorption bands at 1600–1200, 1100–1060, 900–850, and 745–675 cm⁻¹. Optically biaxial negative, $\alpha = 1.584(1)$, $\beta = 1.724(3)$, $\gamma = 1.728(3)$, $2V_{meas} = 16(1)°$, $2V_{calc} = 18°$, $Z \wedge c = 26.5°$ in obtuse β, medium dispersion $r > v$, $Y = b$. Single-crystal X-ray study indicated monoclinic symmetry, space group $P2_1/m$, $a = 13.396(7)$, $b = 5.067(1)$, $c = 6.701(1)$ Å, $\beta = 106.58(1)°$. Strongest lines of the powder pattern are 4.00 (100,$\bar{1}$11,201), 3.269(100,310,$\bar{2}$02,$\bar{4}$01), 2.535(20,020, 112), 2.140(40,221,003,$\bar{5}$12,600), and 2.003(40, several).

The new name is for A.A. Kukharenko (1914–1993), in recognition of his contributions to the geology of the Kola Peninsula. The mineral occurs in carbonatites and zeolite-carbonate rocks in the Khibina and Vuorijärvi alkaline massifs, Kola Peninsula, Russia, in a hornfels xenolith at Mont Saint Hilaire, Québec, and in cavities in the Saint-Amable sill, a nepheline syenite related to the Mont Saint Hilaire alkaline intrusions. Type material is in the Mineralogical Museum of the Department of Mineralogy, Saint Petersburg University, Russia, and in the Canadian Museum of Nature, Ottawa. **J.L.J.**

Nežilovite*

V. Bermanec, D. Holtstam, D. Sturman, A.J. Criddle, M.E. Back, S. Šćavničar (1996) Nežilovite, a new member of the magnetoplumbite group, and the crystal chemistry of magnetoplumbite and hibonite. Can. Mineral., 34, 1287–1297.

Electron microprobe analysis gave PbO 19.01, CaO 0.03, Sb_2O_5 0.25, ZnO 13.23, Fe_2O_3 41.96, Mn_2O_3 7.13, MnO_2 11.01, TiO_2 2.84, Al_2O_3 4.52, MgO 0.08, sum 100.06 wt%, corresponding to $Pb_{0.99}Ca_{0.01}Sb_{0.02}Zn_{1.89}Fe^{3+}_{6.11}Mn^{3+}_{1.05}Mn^{4+}_{1.74}Ti_{0.41}Al_{1.03}Mg_{0.02}$, ideally $PbZn_2(Mn^{4+}, Ti^{4+})_2Fe^{3+}_8O_{19}$. The mineral occurs as black, magnetic, thin tabular {0001} crystals that are hexagonal in outline and up to 1 mm across. Dark brown to nearly black streak, opaque, no internal reflection, prominent {0001} cleavage, $VHN_{25} = 735$ (599–847), $D_{calc} = 5.69$ g/cm³ for $Z = 2$. In reflected light, anisotropic and bireflectant, nonpleochroic. Reflectance values are given in 20 nm steps from 400 to 700 nm; standard values in air and in oil are, respectively, 23.8, 10.0 (470), 22.4, 8.8 (546), 21.7, 8.3 (589), and 20.7, 7.7 (650). Single-crystal X-ray structure study ($R = 0.045$) indicated hexagonal symmetry, space group $P6_3/mmc$, $a = 5.849(1)$, $c = 22.809(2)$ Å. Strongest lines of the powder pattern are 11.39(45,002), 3.811(100,006), 2.858(75,008), 2.745(50,107), and 2.605 (40,114).

The mineral occurs in marble in the Precambrian Pe-

lagonian massif in the Nežilovo area of Macedonia. Type material is in the Natural History Museum at Zagreb, Croatia, in the Royal Ontario Museum, Toronto, and in the Swedish Museum of Natural History, Stockholm. **J.L.J.**

Piretite*

R. Vochten, N. Blaton, O. Peeters, M. Deliens (1996) Piretite, $Ca(UO_2)_3(SeO_3)_2(OH)_4 \cdot 4H_2O$, a new calcium uranyl selenite from Shinkolobwe, Shaba, Zaire. Can. Mineral., 34, 1317–1322.

Electron microprobe analysis of five crystals gave CaO 3.57, UO_3 72.00, SeO_2 19.29, H_2O (TGA) 8.00, sum 102.86, corresponding to $Ca_{0.76}(UO_2)_{3.02}(SeO_3)_{2.09}(OH)_{3.38} \cdot 3.64H_2O$. Occurs as lemon-yellow elongate tablets, irregular in outline and up to 1 × 3 mm, flattened on (001), showing {100}, {010}, and {001}; also as acicular prisms to 5 mm. Pale yellow streak, transparent to translucent, pearly luster, good {001} cleavage, uneven fracture, H = 2.5, nonfluorescent, D_{meas} = 4.00, D_{calc} = 3.87 g/cm^3 for Z = 4. The infrared spectrum has absorption bands at 3303, 2927, and 1623 cm^{-1} for H_2O, at 898 cm^{-1} for UO_2, and at 815, 732, and 468 cm^{-1} for SeO_3. Optically biaxial negative, α_{calc} = 1.54, β = 1.73(1), γ = 1.75(1), $2V$ = 33(5)°, weak dispersion $r > v$, $X \parallel c$, $Y \parallel a$, $Z \parallel b$. Single-crystal X-ray study indicated orthorhombic symmetry, space group $Pmn2_1$ or $Pmnm$; a = 7.010(3), b = 17.135(7), c = 17.606(4) Å as refined from a Guinier-Hägg pattern (Cu$K\alpha_1$ radiation) with strongest lines of 8.79(80,002), 8.56(40,020), 4.30(30,131), 3.51(100,200), 3.032(100,151), and 1.924 (40,237).

The mineral occurs in association with a masuyite-like U-Pb oxide as crusts on uraninite from the U deposit at Shinkolobwe. The name is for Paul Piret, University of Louvain-la-Neuve, Belgium. Type material is in the Royal Belgian Institute of Natural Sciences, Brussels. **J.L.J.**

Wadsleyite II

J.R. Smyth, T. Kawamoto (1997) Wadsleyite II: A new high pressure hydrous phase in the peridotite–H_2O system. Earth Planet. Sci. Lett., 146, E9–E16.

An orthorhombic compound of composition $Mg_{1.71}Fe_{0.177}Al_{0.01}Si_{0.965}H_{0.332}O_4$ synthesized at 1400 °C has a = 5.6884, b = 28.9238, c = 8.2382 Å, with a and c approximating those of wadsleyite, β-$(Mg,Fe^{2+})_2SiO_4$, but with b = 2.5× that of wadsleyite.

Discussion. Although the authors have not chosen a trivial name for the synthetic phase, such compounds do not qualify as minerals and should not be assigned mineral names. **J.L.J.**

Zajacite-(Ce)*

J.L. Jambor, A.C. Roberts, D.R. Owens, J.D. Grice (1996) Zajacite-(Ce), a new rare-earth fluoride from the Strange Lake deposit, Quebec–Labrador. Can. Mineral., 34, 1299–1304.

Electron microprobe analysis (average of seven grains) gave Na 6.4, Ca 11.5, Y 2.2, La 11.3, Ce 22.0, Nd 8.0, Sm 1.1, Gd 2.9, Dy 0.4, F 35.4, sum 101.2 wt%, corresponding to $Na_{0.90}[(REE)_{1.12}Ca_{0.92}]_{\Sigma 2.04}F_6$, wherein Ce is the predominant REE. The simplified formula is $Na(REE,Ca)_2F_6$. Occurs as colorless to pale pink anhedral xenomorphic grains, 1–2 mm across; vitreous luster, white streak, conchoidal fracture, transparent, brittle, nonfluorescent, H = 3½, slowly soluble in hot HCl, D_{meas} = 4.44(1), D_{calc} = 4.55 g/cm^3 for Z = 3. Optically uniaxial positive, ϵ = 1.483(1), ω = 1.503(1), nonpleochroic. Single-crystal X-ray structure study indicated hexagonal (trigonal) symmetry, space group $P\bar{3}$, a = 6.099(1), c = 11.064 Å as refined from a 114.6 mm Gandolfi pattern with strongest lines of 5.29(70,100), 3.036(100,110,103), 2.146(70,203), 1.757(80,300,213), 1.152(40,410), and 0.9189(40,513).

The mineral occurs sparingly disseminated in hypersolvus granite at the Strange Lake Zr-Y-REE-Nb-Be deposit, on the Québec–Labrador boundary, northeast of Shefferville, Québec. Associated minerals include vlasovite, narsarsukite, willemite, fluorite, and bastnäsite-(Ce), the last as an alteration of zajacite-(Ce). The new name is for geologist Ihor Stephan Zajac, who led the exploration group that discovered the Strange Lake deposit, and who first recognized the presence of the new mineral. Type material is in the Systematic Reference Series of the National Mineral Collection, housed at the Geological Survey of Canada, Ottawa. **A.C.R.**

$PdSn_2$, Pd_3Se_2

N.S. Rudashevskiy, V.V. Knauf, N.M. Chernyshov (1995) Platinum-group minerals from Kursk magnetic anomaly black shales. Doklady Akad. Sci., 344(1), 91–95 [English translation in Trans. Russ. Acad. Sci., Earth Sci. Sect., 345(9), 243–249, 1996].

Energy dispersion analysis of grains, up to 15 × 30 μm, that surround a platelet of native palladium gave Pd 31.1, Sn 68.6, sum 99.7 wt%, corresponding to $Pd_{1.00}Sn_{2.00}$. A Pd-Se mineral occurs as rounded grains, up to 20 × 30 μm, and as isolated, zoned, individual crystals to 1 × 6 μm. Analysis of the cores gave Pd 49.4, Pt 20.0, Fe 0.6, Se 30.9, sum 100.9 wt%, corresponding to $(Pd_{2.39}Pt_{0.53}Fe_{0.06})_{\Sigma 2.98}Se_{2.02}$, and analysis of the rims gave Pd 63.3, Pt 4.0, Fe 0.7, Se 32.1, sum 100.1 wt%, corresponding to $(Pd_{2.87}Pt_{0.10}Fe_{0.06})_{\Sigma 3.03}Se_{1.97}$. Only the $PdSn_2$ mineral has a synthetic counterpart. The Pd minerals are associated with sulfides, mainly pyrite and pyrrhotite, in carbonaceous Precambrian black shales in the Voronezh crystalline massif, Voronezh–Kursk area, Russia. **J.L.J.**

$Ag_2Pb_3Bi_2S_7$

G.V. Moralev, V.I. Milyayev (1994) Bismuth mineralization and vertical zoning in the Shkol'noye gold-silver

deposit, Kuraminskiy Range, northern Tajikistan. Doklady Akad. Nauk, 338(6), 802–805 (English translation in Trans. Russ. Acad. Sci., Earth Sci. Sect., 345, 138–143, 1996).

Electron microprobe analysis gave Pb 40.51, Cu 0.16, Ag 14.16, Au 0.13, Fe 0.07, Zn 0.10, Sb 0.72, As 1.30, Bi 26.41, Se 1.97, S 14.11, sum 100.80 wt%; after deduction of Fe and Zn (and Si), the formula corresponds to $(Ag,Au,Cu)_{2.03}Pb_{2.94}(Bi,As,Sb)_{2.25}(S,Se)_{7.01}$, ideally $Ag_2Pb_3Bi_2S_7$. The grains are <30 μm and are associated with argentian tetrahedrite, polybasite, chalcopyrite, galena, native bismuth, and argentian gold in quartz-carbonate veins. **J.L.J.**

Tetragonal $(Zn,Mn)Fe_2O_4$

J.R. Marcano, A.E. Mora, O. Odreman, J.M. Delgado (1996) Single-crystal structural study of a natural (Zn,Mn) ferrite. Materials Research Bull., 31(12), 1587–1592.

Energy dispersion analysis of a dark single-crystal fragment from a mine in the Bailadores region, Mérida, Venezuela, gave an atomic ratio of Zn:Mn:Fe = 1:1:2. Single-crystal X-ray structure study (R = 0.0170) indicated tetragonal symmetry, space group $I4_1/amd$, a = 5.964(2), c = 8.449(3) Å, D_{calc} = 5.275 g/cm³ for Z = 4. The cation distribution refined to $[Zn_{0.74}Fe(Mn)_{0.26}][Zn_{0.01}Fe(Mn)_{1.99}]O_4$.

Discussion. Details about the properties and processing history of the sample are not given. **J.L.J.**

$Al_2Mg_4(OH)_{12}(CO_3)\cdot 3H_2O$

A.V. Arakcheyeva, D.Yu. Pushcharovskii, R.K. Rastsvetaeva, D. Atencio, G.U. Lubman (1996) Crystal structure and comparative crystallochemistry of $Al_2Mg_4(OH)_{12}(CO_3)\cdot 3H_2O$, a new mineral in the hydrotalcite-manasseite group. Kristallografiya, 41(6), 1024–1034 (in Russian).

The mineral occurs as bright orange-red grains, 2–6 mm across, with a hexagonal trapezoidal habit, and prismatic and basal pinacoidal modifications. Perfect pinacoidal cleavage. Single-crystal X-ray structure study (R = 0.039) indicated hexagonal symmetry, space group $P\bar{6}2m$, a = 5.283(3), c = 15.150(9) Å. Within the structure is (1) a brucite-type layer $[AlMg_2(OH)_6]$, (2) a carbonate $[CO_3]$ net, and (3) a net of $[3H_2O]$; these three structural elements have the sequence 1–2–1–3–1. Complete ordering lowers the symmetry and distinguishes the mineral from others in the hydrotalcite-manasseite series. The mineral occurs in dolomitic carbonatite at the Jacupiranga massif, San Paulo, Brazil.

Discussion. See also the abstracts for mineral IMA 92–028 and 92–029, which are closely related and have the same formula. **N.N.P**

New Data

Malladrite

E.K. Serafimova, T.F. Semenova, L.P. Vergasova, S.K. Filatov, V.B. Epifanova, V.V. Anan'yev (1996) New data on malladrite Na_2SiF_6, a mineral of volcanic exhalations from the Large Tolbachik Fissure Eruption. Volcanol. Seismol., (1), 46–55 (in Russian).

Ten electron microprobe analyses gave a mean and range of Na 25.59 (25.26–26.37), K 0.04 (0.02–0.05), Si 14.58 (14.38–14.83), F 60.62 (59.90–61.20), sum 100.83 (99.71–101.99) wt%, corresponding to $Na_{2.05}Si_{0.98}F_6$. Occurs as colorless to white tablets up to 0.5 mm across and 0.2 mm thick, showing {0001}, $\{1\bar{1}20\}$, and $\{10\bar{1}0\}$. Vitreous to greasy luster, perfect {0001} cleavage, $VHN_{10\text{-}20}$ = 78–84 on (0001), H_{calc} = 2.9, D_{calc} = 2.756 g/cm³ for Z = 3. Solubility 5.7, 9.9, and 24.6 g/L at 15, 40, and 100 °C, respectively. Optically uniaxial negative, n = <1.33. Trigonal symmetry, space group $P\bar{3}m1$ or $P321$, a = 8.859(1), c = 5.040(1) Å. Strongest lines of the powder pattern (diffractometer, Cu$K\alpha$ radiation, 40 lines given) are 4.426(67,110), 4.210(70,101), 3.325(80,111), 3.053(67,201), 2.281(100,301), and 1.795(78,302), in good agreement with data for synthetic Na_2SiF_6.

The mineral occurs in an open fissure at the edge of a northern crater of the Large Tolbachik Fissure Eruption, Kamchatka, Russia, and constitutes up to 19 wt% of white and brownish white exhalation crusts of gypsum, possibly anhydrite, and minor unidentified complex fluorides. Malladrite was found in 1985, when the walls of the fissure were at 60 °C and temperatures of the fumarolic gases were <100 °C. In 1988 and 1989, when temperatures were higher, the amount of malladrite decreased in the exhalations.

Discussion. The description adds to the previously incomplete data for the physical properties of the mineral. **N.N.P.**