

New Mineral Names*

JOHN L. JAMBOR^{1,†} AND ANDREW C. ROBERTS²

¹Department of Earth and Ocean Sciences, University of British Columbia, Vancouver, British Columbia V6T 1Z4, Canada

²Geological Survey of Canada, 601 Booth Street, Ottawa K1A 0E8, Canada

ALSAKHAROVITE-Zn*

I.V. Pekov, N.V. Chukhanov, A.E. Zadov, K.A. Rozenberg, R.K. Rastsvetaeva (2003) Alskharovite-Zn, NaSrKZn(Ti,Nb)₄[Si₄O₁₂]₂(O,OH)₄·7H₂O, a new mineral of the labuntsovite group from the Lovozero massif, Kola Peninsula. Zapiski Vseross. Mineral. Obshch., 132(1), 52–58 (in Russian, English abs.).
K.A. Rozenberg, R.K. Rastsvetaeva, I.V. Pekov, N.V. Chukhanov (2002) New zinc-rich representative of the labuntsovite group: Crystal structure and microtwinning. Doklady Chemistry, 383(4–6), 110–113.

Electron microprobe analysis gave Na₂O 2.04, K₂O 2.43, CaO 1.48, SrO 4.49, BaO 3.65, MgO 0.04, MnO 0.11, FeO 0.22, ZnO 5.02, Al₂O₃ 0.15, SiO₂ 39.33, TiO₂ 18.89, Nb₂O₅ 12.57, H₂O (TGA) 11.1, sum 101.42 wt%, corresponding to (Na_{0.68}Ca_{0.32})_{Σ1.0}(Sr_{0.53}Na_{0.12})_{Σ0.65}(K_{0.63}Ba_{0.29})_{Σ0.92}(Zn_{0.75}Fe_{0.04}Mn_{0.02}Mg_{0.01})_{Σ0.82}(Ti_{2.88}Nb_{1.15})_{Σ4.03}(Si_{7.96}Al_{0.04})_{Σ8}O₂₄[O_{2.58}(OH)_{1.42}]_{Σ4}·6.80H₂O, simplified as in the title. Occurs as white, pale brown, or colorless crystals up to 0.5 × 2 × 8 mm, elongate [010], vitreous luster, transparent to translucent, brittle, white streak, no cleavage, uneven fracture, $H = 5$, $D_{\text{meas}} = 2.90$, $D_{\text{calc}} = 2.93$ g/cm³ for $Z = 2$, microtwinning on (001) and ($\bar{4}01$). Optically biaxial positive, $\alpha = 1.680(1)$, $\beta = 1.687(2)$, $\gamma = 1.787(5)$, $2V_{\text{meas}} = 25(10)$, $2V_{\text{calc}} = 31^\circ$, nonpleochroic, no dispersion observed, orientation $Y = b$. Single-crystal X-ray structure study ($R = 0.058$) indicated monoclinic symmetry, space group Cm , $a = 14.495(10)$, $b = 13.945(10)$, $c = 7.838(8)$ Å, $\beta = 117.75(7)^\circ$, gutkovaite structural type. Strongest lines of the X-ray powder pattern (57 mm camera, FeK α radiation) are 6.96(100,020,001), 3.21(80,42 $\bar{1}$,400), 3.11(90,041,022,240), 2.50(40,44 $\bar{1}$,403), and 1.70(40,463,444,461,442).

The mineral occurs in cavities in eudialyte-aegirine-feldspar pegmatite at Mt. Lepkhe-Nelm, Lovozero alkaline massif, Kola Peninsula, Russia. Among the associated minerals are lamprophyllite, natrolite, halloysite, ranciéite, kuzmenkoite-Zn, and tsepinité-Na. The new mineral name is for Russian geologist Aleksey S. Sakharov (1910–1996) and for the predominance of Zn at the D site. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **J.L.J.**

CAICHENGYUNITE

Ru-bo Zhang, Yu-yu Zhang, Zhou Hong, Zi-hua Mao, Falu Liu, Ji Xi (2002) Caichengyunite (Fe₃²⁺Al₂(SO₄)₆·30H₂O): A hydrous sulphate mineral. J. Central South Univ. Technol., 33(4), 331–334 (in Chinese, English abs.).

The mineral forms grayish white, filiform, fibrous aggregates in which the grains are up to 30 mm long and 0.01 mm in diameter. Transparent, vitreous to silky luster, white streak, $H = 1\frac{1}{2}$ –2, nonfluorescent, rapidly soluble in water, $D_{\text{meas}} = 2.20$, $D_{\text{calc}} = 2.19$ g/cm³ for the ideal formula and $Z = 4$. Optically colorless, non-pleochroic, biaxial positive, $\alpha = 1.4756$, $\beta = 1.4775$, $\gamma = 1.4805$, inclined extinction of 5–10° parallel to the fibers. Wet-chemical analysis gave FeO 16.15, Al₂O₃ 7.90, SO₃ 33.96, H₂O⁺ 37.64, H₂O⁻ 3.56, insoluble 0.32, sum 99.53 wt%, which for SO₄ = 6 and H₂O⁺ corresponds to Fe_{3.17}Al_{2.19}(SO₄)₆(H₂O)_{29.6}, ideally Fe₃Al₂(SO₄)₆·30H₂O. Indexing of the X-ray powder diffractogram (39 lines listed) gave a monoclinic cell with $a = 7.63$, $b = 24.13$, $c = 22.64$ Å, $\beta = 111.06^\circ$. Strongest peaks are 5.494(14,121), 4.886(100,131), 3.776(21,124), 3.252(13,036), and 2.727(12,205,117). TGA and DTA patterns are illustrated; TGA shows a two-step weight loss that, on the DTA curve, corresponds to strong and moderate endothermic peaks at ~172 and ~756 °C, respectively. The infrared spectrum, also illustrated, has strong absorptions for H₂O and SO₄.

The mineral occurs with pyrite, galena, sphalerite, chalcopyrite, limonite, and clay minerals on the underground walls of an oxidized Pb-Zn ore deposit at the village of Longshu, Huidong County, Sichuan Province, China. The new mineral name refers to Chinese female geological professor Cai Chen Yung (1907–1982), where Cai is the surname. No repository for type material is given.

Discussion. Contrary to the statement in the text, data have not been submitted to the CNMMN for a vote on the mineral or new name. **J.L.J.**

KOZOITE-(La)*

R. Miyawaki, S. Matsubara, K. Yokoyama, S. Iwano, K. Hama-saki, I. Yukinori (2003) Kozoite-(La), La(CO₃)(OH), a new mineral from Mitsukoshi, Hizen-cho, Saga Prefecture, Japan. J. Mineral. Petrol. Sci., 98, 137–141.

Pale violet spherules, <1 mm in diameter, consist of kozoite-(Nd) that is chemically concentrically zoned, with compositions extending to the La-dominant analog for which

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

† E-mail: J.L.Jambor@aol.com

the average of four listed electron microprobe analyses is La_2O 35.55, Pr_2O_3 4.68, Nd_2O_3 17.60, Sm_2O_3 1.15, Gd_2O_3 1.49, Dy_2O_3 0.09, Er_2O_3 0.04, Y_2O_3 3.88, CaO 6.30, SrO 1.36, CO_2 (calc.) 23.17, H_2O (calc.) 5.87, sum 101.19 wt%, corresponding to $(\text{La}_{0.83}\text{Nd}_{0.40}\text{Y}_{0.13}\text{Pr}_{0.11}\text{Sm}_{0.03}\text{Gd}_{0.03})_{\Sigma 1.53}(\text{Ca}_{0.43}\text{Sr}_{0.05})_{\Sigma 0.48}(\text{CO}_3)_2(\text{OH})_{1.52}\cdot 0.48\text{H}_2\text{O}$, simplified as $(\text{La,Nd,Ca})(\text{CO}_3)[(\text{OH}),(\text{H}_2\text{O})]$, ideally $\text{La}(\text{CO}_3)(\text{OH})$. An IR spectrum confirmed the presence of OH and CO_3 . The La-dominant zones have a radius of up to 0.15 mm. Pale purple to white color, vitreous luster, $D_{\text{calc}} = 4.16 \text{ g/cm}^3$ for $Z = 4$, readily soluble with effervescence in dilute HCl. Indexing of the X-ray powder pattern (114 mm Gandolfi, $\text{CuK}\alpha$ radiation) gave an orthorhombic cell with $a = 4.986(4)$, $b = 8.513(6)$, $c = 7.227(10) \text{ \AA}$; strongest lines are 4.31(100,110,020), 3.69(72,111,021), 2.93(57,121,102), 2.33(50,131), 2.06(48,221), and 1.994(35,212).

The mineral is associated with kozoite-(Nd), lanthanite-(Nd), kimuraite-(Y), lokkaite-(Y), calcite, aragonite, and opal in cavities within alkali olivine basalt at Mitsukoshi, Saga Prefecture, Japan. Type material is in the National Science Museum, Tokyo. **J.L.J.**

PARAVINOGRADOVITE*

A.P. Khomyakov, I.E. Kulikova, E. Sokolova, F.C. Hawthorne, P.M. Kartashov (2003) Paravinogradovite, $(\text{Na},\square)_2[(\text{Ti}^{4+},\text{Fe}^{3+})_4\{\text{Si}_2\text{O}_6\}_2\{\text{Si}_3\text{AlO}_{10}\}(\text{OH})_4]\text{H}_2\text{O}$, a new mineral species from the Khibina alkaline massif, Kola Peninsula, Russia: description and crystal structure. *Can. Mineral.*, 41, 989–1002.

The mineral forms fan-shaped aggregates of columnar to acicular crystals, elongate [100] and up to 1 cm long. Colorless to white, transparent to translucent, vitreous to pearly luster, white streak, $H = 5$, brittle, splintery fracture, perfect {001} and indistinct {010} cleavages, $D_{\text{meas}} = 2.77(2)$, $D_{\text{calc}} = 2.76 \text{ g/cm}^3$ for $Z = 1$, weak yellow-green fluorescence under ultraviolet light at 240–400 nm, insoluble in 1:1 HCl and HNO_3 at room temperature. Optically biaxial negative, $\alpha = 1.707(2)$, $\beta = 1.741(2)$, $\gamma = 1.755(2)$, $2V_{\text{meas}} = 64(1)$, $2V_{\text{calc}} = 64^\circ$, dispersion $r > v$, orientation $b \approx Z$, $a \wedge X = 30^\circ$, negative elongation. Electron microprobe analysis gave Na_2O 7.77, K_2O 0.87, MgO 0.13, BeO (calc.) 0.76, Al_2O_3 6.12, Fe_2O_3 4.11, TiO_2 29.59, Nb_2O_5 0.50, SiO_2 43.54, H_2O (calc.) 6.23, sum 99.62 wt%, corresponding to $(\text{Na}_{2.293}\text{K}_{0.169})_{\Sigma 2.462}(\text{Ti}_{3.386}\text{Fe}_{0.471}\text{Nb}_{0.034}\text{Mg}_{0.029})_{\Sigma 3.920}(\text{Si}_{6.626}\text{Al}_{1.098}\text{Be}_{0.276})_{\Sigma 8.000}\text{O}_{22}(\text{OH})_4(\text{H}_2\text{O})_{1.16}$. Single-crystal X-ray structure study ($R = 0.0445$) indicated triclinic symmetry, space group $P1$; $a = 5.246(1)$, $b = 8.734(3)$, $c = 12.968(5) \text{ \AA}$, $\alpha = 70.32(1)$, $\beta = 79.01(1)$, $\gamma = 80.90(2)^\circ$ as refined from a powder pattern (diffractometer, $\text{CuK}\alpha$ radiation) with strongest lines of 11.9(58,001), 5.98(35,002), 5.88(65,011,012), 4.35(38,021,102), 3.182(100,013,014), and 3.085(20,123).

The mineral occurs as growths on albite in miarolitic cavities within a pegmatite at Mt. Kukisvumchorr, Khibina alkaline massif, Kola Peninsula, Russia. Associated minerals are carbonate-fluorapatite, ancylite-(Ce), natrolite, aegirine, nepheline, K-feldspar, analcime, biotite, chlorite, and others. The new mineral name alludes to the close relationship of the crystal structure and chemical composition to those of vinogradovite. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **J.L.J.**

TSEPINITE-CA*

I.V. Pekov, N.V. Chukanov, G. Ferraris, A. Gula, D.Yu. Pushcharovsky, A.E. Zadov (2003) Tsepinitite-Ca, $(\text{Ca},\text{K},\text{Na},\square)_2(\text{Ti},\text{Nb})_2(\text{Si}_4\text{O}_{12})(\text{OH},\text{O})_2\cdot 4\text{H}_2\text{O}$, a new mineral of the labuntsovite group from the Khibiny alkaline massif, Kola Peninsula—Novel disordered sites in the vuoriyarvite-type structure. *Neues Jahrb. Mineral. Mon.*, 461–480.

The mineral forms prismatic to acicular poorly terminated crystals, up to $0.2 \times 0.6 \times 5 \text{ mm}$, that are commonly in open-work aggregates or in sheaf-like clusters to 1 cm and $2 \times 6 \text{ mm}$, respectively. Transparent, colorless to white and pale brown, vitreous luster, brittle, no cleavage, uneven fracture, $H = 5$, probable forms {100} and {001}, nonfluorescent, $D_{\text{meas}} = 2.73$, $D_{\text{calc}} = 2.72 \text{ g/cm}^3$ for $Z = 4$. Optically biaxial positive, $\alpha = 1.666(2)$, $\beta = 1.676(2)$, $\gamma = 1.780(4)$, $2V_{\text{meas}} = 30(10)^\circ$, $2V_{\text{calc}} = 36^\circ$, weak dispersion $r < v$, $Y = b$. Electron microprobe analysis gave Na_2O 1.32, K_2O 2.23, CaO 5.29, SrO 3.01, BaO 3.52, MnO 0.16, FeO 0.04, ZnO 0.12, Al_2O_3 0.04, SiO_2 41.06, TiO_2 21.95, Nb_2O_5 9.08, H_2O (TGA) 13.30, sum 101.12 wt%, which for $\text{Si} + \text{Al} = 8$ corresponds to $(\text{Ca}_{1.10}\text{K}_{0.55}\text{Na}_{0.50}\text{Sr}_{0.34}\text{Ba}_{0.27}\text{Mn}_{0.03}\text{Zn}_{0.02}\text{Fe}_{0.01})_{\Sigma 2.82}(\text{Ti}_{3.21}\text{Nb}_{0.80})_{\Sigma 4.01}(\text{Si}_{7.99}\text{Al}_{0.01})_{\Sigma 8.00}(\text{OH})_{2.58}\text{O}_{1.42}]_{\Sigma 4} \cdot 7.35\text{H}_2\text{O}$, simplified as in the title. Single-crystal X-ray structure study ($R = 0.11$) indicated monoclinic symmetry, space group $C2/m$, $a = 14.484(4)$, $b = 14.191(4)$, $c = 7.907(2) \text{ \AA}$, $\beta = 117.26(2)^\circ$. Strongest lines of the powder pattern (86 mm camera, $\text{FeK}\alpha$ radiation) are 7.02(60,020,001), 3.53(45,131), 3.16(100,041,022), 2.62(45,203,202), 2.51(85,441,403,042), and 1.718(50, several).

The mineral, which is in the vuoriyarvite subgroup of the labuntsovite group and which is the Ca-dominant analog of tsepinitite-Na and tsepinitite-K, is most closely associated with natrolite and ancylite-(Ce) that occur mainly in cavities formed by the hydrothermal leaching of rinkite in a pegmatite that cuts nepheline syenite in the underground Lovchorr mine at Hackman Valley, Mount Yukspor, Khibiny alkaline massif, Kola Peninsula, Russia. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. **J.L.J.**

TSEPINITE-K*, PARATSEPINITE-BA*

N.V. Chukanov, I.V. Pekov, A.E. Zadov, K.A. Rosenberg, R.K. Rastsvetaeva, S.V. Krivovichev, L.A. Levitskaya (2003) New minerals tsepinitite-K $[(\text{K},\text{Ba},\text{Na})_2(\text{Ti},\text{Nb})_2(\text{Si}_4\text{O}_{12})(\text{OH},\text{O})_2] \cdot 3\text{H}_2\text{O}$ and paratsepinitite-Ba $(\text{Ba},\text{Na},\text{K})_2(\text{Ti},\text{Nb})_2(\text{Si}_4\text{O}_{12})(\text{OH},\text{O})_2 \cdot 4\text{H}_2\text{O}$ and their relationship with other labuntsovite-group members. *Zapiski Vseross. Mineral. Obshch.*, 132(1), 38–51 (in Russian, English abs.).

K.A. Rosenberg, R.K. Rastsvetaeva, N.V. Chukanov, I.V. Pekov (2002) Crystal structure of the new mineral tsepinitite-K. *Doklady Akad. Nauk*, 386, 345–349 (in Russian).

Tsepinitite-K

The mineral occurs as short prismatic crystals up to 0.4 mm long, showing {001}, {010}, {100}, and $\{201\}$. Light brown, white, or colorless, vitreous luster, transparent, brittle, $H = 5$, imperfect cleavage, $D_{\text{meas}} = 2.88(3)$, $D_{\text{calc}} = 2.79 \text{ g/cm}^3$ for $Z = 4$. Biaxial positive, $\alpha = 1.690(3)$, $\beta = 1.701(3)$, $\gamma = 1.800(5)$, $2V_{\text{meas}}$

= 25–40°. Electron microprobe analysis gave Na₂O 2.14, K₂O 6.54, BaO 11.28, MnO 1.15, FeO 0.37, SiO₂ 38.86, TiO₂ 21.47, Nb₂O₅ 7.05, H₂O (TGA) 10.34, sum 99.20 wt%, corresponding to (K_{0.86}Ba_{0.46}Na_{0.43}Mn_{0.10})_{Σ1.85}(Ti_{1.66}Nb_{0.33}Fe_{0.03}⁺)_{Σ2.02}Si₄O₁₂(OH)_{1.21}O_{0.79}·2.94H₂O, simplified as given in the title. Single-crystal X-ray structure study ($R = 0.033$) indicated monoclinic symmetry, space group Cm , $a = 14.327(3)$, $b = 13.802(2)$, $c = 7.783(1)$ Å, $\beta = 116.95(1)^\circ$. Strongest lines of the X-ray powder pattern (114 mm Debye–Scherrer camera, FeK α radiation) are 6.87(100,001,020), 3.20(60,400), 3.05(80,022,041), 3.00(60,240,24 $\bar{1}$), and 2.56(90,203, 331).

The mineral is the K-dominant analog of tsepinite-Na. The holotype locality is Mt. Karnasurt, Lovozero alkaline massif, Kola Peninsula, Russia, at which the mineral occurs in alkaline pegmatites as pseudomorphs after murmanite and is associated with other labuntsovite-group minerals, aegirine, mangannepuntite, natrolite, chabazite-Ca, yofortierite, nontronite, and kaolinite-group minerals. Data are also given for occurrences at Mt. Kukisvumchorr and Mt. Eveslogchorr, Khibiny massif. Type material, and that of paratsepinite-Ba, is in the Fersman Mineralogical Museum, Moscow, Russia.

Paratsepinite-Ba

The mineral occurs as light brown, imperfect, elongate prismatic crystals to 5 mm. Vitreous luster, transparent, brittle, imperfect cleavage, $H = 5$, $D_{\text{meas}} = 2.88(3)$, $D_{\text{calc}} = 2.91$ g/cm³ for $Z = 8$. Optically biaxial positive, $\alpha = 1.667(2)$, $\beta = 1.674(2)$, $\gamma = 1.770(5)$, $2V_{\text{meas}} = 25\text{--}40$, $2V_{\text{calc}} = 31^\circ$, nonpleochroic. Electron microprobe analysis gave Na₂O 1.80, K₂O 1.69, CaO 0.51, SrO 1.96, BaO 11.02, MnO 1.25, Al₂O₃ 0.22, SiO₂ 38.86, TiO₂ 17.73, Nb₂O₅ 11.60, H₂O (TGA) 12.86, sum [99.50] wt%, corresponding to (Ba_{0.46}Na_{0.37}K_{0.23}Sr_{0.12}Mn_{0.10}Ca_{0.06})_{Σ1.34}(Ti_{1.40}Nb_{0.55})_{Σ1.95}(Si_{3.97}Al_{0.03}O₁₂(OH)_{1.58}O_{0.42}·3.7H₂O, simplified as in the title. Single-crystal X-ray structure study ($R = 0.072$) indicated monoclinic symmetry, space group $C2/m$, $a = 14.551(2)$, $b = 14.001(2)$, $c = 15.702(3)$ Å, $\beta = 117.58(1)^\circ$. Strongest lines of the powder pattern (114 mm Debye–Scherrer, FeK α radiation) are 7.11(100,020), 4.08(80,310), 3.95(100,202,20 $\bar{4}$), 3.24(90,400,40 $\bar{4}$), 3.11(80,042,024), 2.403(80,60 $\bar{2}$), 1.914(90,20 $\bar{8}$), and 1.634(80,75 $\bar{5}$).

The mineral is associated with titanite, aegirine, eudialyte, lamprophyllite, lorenzenite, natrolite, and others, including labuntsovite-group minerals, in alkaline pegmatite at Mt. Lepkhe-Nelm, Lovozero alkaline massif, Kola Peninsula. The new mineral is the Ba-dominant analog of tsepinite-Na, with c doubled. **J.L.J.**

TSUMGALLITE*

J. Schlüter, K.-H. Klaska, G. Adiwidjaja, G. Gebbard (2003) Tsumgallite, GaO(OH), a new mineral from the Tsumeb mine, Tsumeb, Namibia. Neues Jahrb. Mineral. Mon., 521–527.

Electron microprobe analysis gave Ga₂O₃ 78.13, Fe₂O₃ 3.99, GeO₂ 4.01, ZnO 0.78, SiO₂ 1.07, H₂O 8.77 on the basis of the ideal formula GaO(OH), sum 96.75 wt%, corresponding to (Ga_{0.86}Fe_{0.05}Ge_{0.04}Si_{0.02}Zn_{0.01})_{Σ0.98}O(OH)_{1.01}. The mineral forms irregular aggregates (<1 mm) of mica-like platelets, each up to 40 × 40 × 1 μm, tabular on {010}. Pale greenish yellow to beige color, translucent, pearly luster, soft, white streak, perfect {010} cleavage,

nonfluorescent, $D_{\text{calc}} = 5.08$ g/cm³ for the empirical formula and $Z = 4$. Optically biaxial, $n_{\text{calc}} = 1.96\text{--}1.97$. Indexing of the X-ray powder pattern (Guinier camera, MoK α radiation) and Rietveld refinement ($R = 0.039$) indicated orthorhombic symmetry, space group $Pbnm$, $a = 4.512(5)$, $b = 9.772(8)$, $c = 2.967$ Å, isostructural with goethite and diasporite. Strongest lines of the powder pattern are 4.089(100,110), 2.632(33,130), 2.530(22,021), 2.404(100,111), 1.690(26,221), and 1.538(21,151,160).

The mineral is closely associated with söhngeite and siderite in vugs within specimens of tennantite-germanite ore that were collected in the late 1960s by the chief mine geologist at the second oxidation zone of the Tsumeb deposit, Namibia. The new mineral name refers to the locality and chemical composition. Type material is in the Mineralogical Museum of the University of Hamburg, Germany. **J.L.J.**

WATATSUMIITE*

S. Matsubara, R. Miyawaki, M. Kurosawa, Y. Suzuki (2003) Watatsumiite, KNa₂LiMn₂V₂Si₈O₂₄, a new mineral from the Tanohata mine, Iwate Prefecture, Japan. J. Mineral. Petrol. Sci., 98, 142–150.

The mineral forms yellowish green short prismatic crystals, elongate [001] and <0.8 mm in length, and massive aggregates <2 mm in diameter. Electron microprobe analysis gave Na₂O 7.10, K₂O 4.89, Li₂O (by LAM-ICP-MS) 1.6, CaO 0.03, MgO 1.61, BaO 0.88, MnO 12.28, FeO 0.35, VO₂ 15.10, TiO₂ 3.13, SiO₂ 52.64, sum 99.61 wt%, corresponding to (K_{0.94}Ba_{0.05})_{Σ0.99}Na_{2.08}Li_{0.97}(Mn_{1.57}Mg_{0.36}Fe_{0.04})_{Σ1.97}(V_{1.66}Ti_{0.36})_{Σ2.02}Si_{7.97}O₂₄, simplified as in the title. Transparent, vitreous luster, brittle, streak white with a greenish tint, conchoidal fracture, poor cleavage, $VHN_{100} = 707\text{--}946$, $H = 5^{1/2}\text{--}6$, $D_{\text{calc}} = 3.24$ g/cm³ for the empirical formula and $Z = 4$. Optically biaxial positive, $\alpha = 1.686(2)$, $\beta_{\text{calc}} = 1.694$, $\gamma = 1.720(5)$, $2V_{\text{meas}} = 60(5)^\circ$, perceptible dispersion $v > r$, moderate yellowish to pale yellowish green pleochroism. Single-crystal X-ray structure study ($R_1 = 0.033$) indicated monoclinic symmetry, space group Cc , isostructural with neptunite; $a = 16.450(16)$, $b = 12.492(7)$, $c = 9.995(8)$ Å, $\beta = 115.32(6)^\circ$ as refined from a Gandolfi pattern (114 mm, CuK α radiation) with strongest lines of 9.58(84,110), 4.52(85,002), 3.52(63,131), 3.19(100,330,132), 2.94(90,223), 2.90(66,222,510), and 2.49(93,441,621).

The mineral is closely associated with potassic leakeite in dump material from the No. 3 orebody at the Tanohata mine, which contains V-bearing minerals such as suzukiite and roscoelite. The new mineral name is derived from Watatsumi, the Japanese god of the sea, in recognition that the mineral is the V and Mn analog of neptunite, whose name alludes to Neptune, the Roman god of the sea. Type material is in the National Science Museum, Tokyo, Japan. **J.L.J.**

CUBIC CARBON

A. El Goresy, L.S. Dubrinovsky, P. Gillet, S. Mostefaoui, G. Graup, M. Drakopoulos, A.S. Simionovici, V. Swamy, V.L. Masaitis (2003) A new natural, super-hard, transparent polymorph of carbon from the Popigai impact crater, Russia. C.R. Geosci., 335, 889–898.

A 70 μm platelet in a polished section of diamond-bearing

shocked gneiss from the Popigai crater, Russia, consists of pure carbon encompassed within cristobalite and quartz in a matrix of melted plagioclase. Raman spectroscopy indicated that the outermost portion of the platelet contains polycrystalline graphite, and synchrotron X-ray diffraction mapping revealed that the transparent interior consists of a cubic carbon mineral enveloped by lonsdaleite. The cubic mineral has a polishing hardness even greater than that of lonsdaleite, and the Raman spectrum consists of two broad bands at ~ 1390 and 1600 cm^{-1} , which differ from those of previously known carbon polymorphs. The X-ray pattern has 23 diffraction lines (listed, no intensities), indexable with a cubic cell, space group $Pm\bar{3}m$, $a = 14.697(1)\text{ \AA}$. A species of this type has not been synthesized and its existence has not been predicted by theoretical calculations. **J.L.J.**

Ag₂Cu₂TeS

N.J. Cook, C.L. Ciobanu (2003) Cervelleite, Ag₄TeS, from three localities in Romania, substitution of Cu, and the occurrence of the associated phase, Ag₂Cu₂TeS. *Neues Jahrb. Mineral. Mon.*, 321–336.

One of five listed electron microprobe analyses has Ag 44.04, Cu 25.91, Bi 0.18, Sb 0.07, S 7.18, Se 0.30, Te 22.96, sum 100.64 wt%, corresponding to (Ag_{2.00}Cu_{2.00})_{Σ4.00}(Te_{0.88}S_{1.10}Se_{0.02})_{Σ2.00}, simplified as Ag₂Cu₂TeS. Minor compositional variation with respect to Ag/(Ag + Cu) and Te/(Te + S) has been detected, but a large compositional gap between Cu-bearing cervelleite and Ag₂Cu₂TeS is present. The mineral, which occurs in grains up to about 30 μm, is optically isotropic, blue-gray in reflected light, and has a noticeably lower reflectance than that of cervelleite. The two minerals are commonly associated in the Băița Bihor and Ocna de Fier skarn deposits in western Romania. **J.L.J.**

FeCr₂O₄, ORTHORHOMBIC

Ming Chen, Jinfu Shu, Xiande Xie, Ho-kwang Mao (2003) Natural CaTi₂O₄-structured FeCr₂O₄ polymorph in the Suizhou meteorite and its significance in mantle mineralogy. *Geochim. Cosmochim. Acta.*, 67, 3937–3942.

The Suizhou chondrite meteorite contains shock-produced veins, up to 90 μm wide, that contain ringwoodite, majorite, NaAlSi₃O₈ with the hollandite structure, and eutectic intergrowths of troilite–FeNi; also present is a mineral that occurs within the veins as homogeneous grains, <20 μm across, and as polycrystalline aggregates up to 40 μm across adjacent to the veins. Electron microprobe analysis gave MgO 2.62, MnO 0.81, FeO 29.70, Al₂O₃ 5.94, Cr₂O₃ 57.30, V₂O₅ 0.97, TiO₂ 2.59, sum 99.93 wt% [corresponding to (Fe_{0.88}Mg_{0.14}Mn_{0.02})_{Σ1.04}(Cr_{1.60}Al_{0.25}Ti_{0.07}V_{0.03})_{Σ1.95}O₄]; the composition is almost identical to that of coexisting chromite, and in some particles the two minerals are separated by an intermediate zone of complex mutual intergrowth. The Raman spectrum has bands at 601, 637, and 664

cm^{-1} , which differ from the bands in the spectrum of chromite. Synchrotron X-ray diffraction gave a powder pattern in which a minor amount of chromite is present and in which the 21 listed lines (no intensities) are indexable with an orthorhombic CaTi₂O₄ structure, space group $Bbmm$, yielding $a = 9.462(6)$, $b = 9.562(9)$, $c = 2.916(1)\text{ \AA}$; $D_{\text{calc}} = 5.63\text{ g/cm}^3$ for $Z = 4$ and the ideal formula FeCr₂O₄ [$D_{\text{calc}} = 5.35\text{ g/cm}^3$ for the empirical formula]. The mineral assemblage in the shock veins constrains their pressure of formation to 20–23 GPa at 1800–2000 °C. **J.L.J.**

NEW DATA

ARHBARITE

W. Krause, H.-J. Bernhardt, H. Effenberger, U. Kolitsch, Ch. Lengauer (2003) Redefinition of arhbarite, Cu₂Mg(AsO₄)(OH)₃. *Mineral. Mag.*, 67, 1099–1107.

Electron microprobe analysis of arhbarite from the type locality (Bou Azzer, Morocco) and from the El Guanaco mine, Chile, gave respective values of MgO 10.20, 8.36, CuO 47.46, 50.71, NiO 0.20, not detected (nd), CoO 0.24, nd, ZnO nd, 0.13, P₂O₅ not measured, 0.10, As₂O₅ 33.85, 33.05, SiO₂ 0.10, 0.24, H₂O (calc.) 7.58, 7.49, sum 99.63, 100.08 wt%, which for O = 7 correspond to Cu_{1.98}(Mg_{0.88}Cu_{0.09}Ni_{0.01}Co_{0.01})_{Σ0.99}(AsO₄)_{1.02}(OH)_{2.92} and Cu_{1.99}(Mg_{0.73}Cu_{0.25}Zn_{0.01})_{Σ0.99}[(AsO₄)_{1.01}(SiO₄)_{0.01}]_{Σ1.02}(OH)_{2.92}, thus confirming the essential presence of previously overlooked Mg. Rietveld refinement of X-ray diffractometer powder data for material from the type locality gave triclinic symmetry, space group $P1$, $a = 5.315(4)$, $b = 5.978(6)$, $c = 5.030(6)\text{ \AA}$, $\alpha = 113.58(6)$, $\beta = 97.14(7)$, $\gamma = 89.30(8)^\circ$, $Z = 1$, isotypic with gilmartite Cu₃(AsO₄)(OH)₃. The CNMMN has approved the redefinition. **J.L.J.**

HÜGELITE

A.J. Locock, P.C. Burns (2003) The structure of hügelite, an arsenate of the phosphuranylite group, and its relationship to dumontite. *Mineral. Mag.*, 67, 1109–1120.

Single-crystal X-ray structure study ($R_1 = 0.033$) of hügelite from Geroldseck, Baden, which is in the vicinity of the type locality, showed that the mineral is twinned by pseudo-merohedry. The new unit cell is monoclinic, space group $P2_1/m$, $a = 31.066(3)$, $b = 17.303(2)$, $c = 7.043(1)\text{ \AA}$, $\beta = 96.492(2)^\circ$, $D_{\text{calc}} = 5.74\text{ g/cm}^3$ for Pb₂[(UO₂)₃O₂(AsO₄)₂](H₂O)₅ and $Z = 8$. Although hügelite is chemically the As analog of dumontite, the two are not isostructural. **J.L.J.**

ERRATA

In the abstract for torbernite–zeunerite–metatorbernite–metazeunerite (*Am. Mineral.*, 88, p. 252, 2003), the formula for zeunerite should read Cu[(UO₂)(AsO₄)₂](H₂O)₁₂ and $a = 7.1797(3)\text{ \AA}$. **J.L.J.**