

New Mineral Names

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ABSTRACT

This issue of New Mineral Names highlights some of the newly described minerals as reported by the IMA and recently published/in press articles from January–March 2024. The minerals included are: pfaffenbergite, pabellóndepicaite, allanite-(Sm), heflikite, kvačekite, and bimbowrieite.

RECENTLY APPROVED

This section features just a few of the 30 minerals approved by the IMA-CNMNC for the period of January to April 2024; see Table 1 for the list and cursory details of all 30 minerals (Bosi et al. 2024a, 2024b).

Pfaffenbergite, $\text{KNa}_3(\text{Al}_4\text{Si}_{12})\text{O}_{32}$

Pfaffenbergite (IMA2023-105), ideally $\text{KNa}_3(\text{Al}_4\text{Si}_{12})\text{O}_{32}$, is a new mineral isostructural with kokchetavite and wodegongjieite (Ferrero et al. 2024). The structure of pfaffenbergite is hexagonal, space group $P6/mmc$ with cell parameters $a = 10.258(3)$ and $c = 14.775(5)$ Å. Pfaffenbergite, kokchetavite, and wodegongjieite have a sheet silicate structure with a topology identical to that of cymrite, wherein two tetrahedral sheets are joined by bridging apical O atoms with no octahedral sheet (Romanenko et al. 2021; Mugnaioli et al. 2022). The type specimen was collected at Pfaffenberg in Saxony, Germany, and its location of discovery is the origin of the new mineral's name. Pfaffenberg hosts exposures of the Paleozoic-aged Bohemian massif, the core of which consists of a suite of high-pressure rocks, including eclogite, granulite, and garnet peridotite units. Pfaffenbergite, kokchetavite, and wodegongjieite were all first discovered in high-pressure rocks (Hwang et al. 2004; Xiong et al. 2020; Borghini et al. 2024). Kokchetavite has been reported elsewhere in the Bohemian massif (Ferrero et al. 2016). Type material is deposited at the University of Cagliari Leonard De Prunner Museum of Mineralogy, Via Trentino, Cagliari, Italy, with the designation “FIB foil no. 6461.”

Pabellóndepicaite, $\text{Cu}_2^+(\text{N}_3\text{C}_2\text{H}_2)_2(\text{NH}_3)_2(\text{NO}_3)\text{Cl}\cdot 2\text{H}_2\text{O}$

Pabellóndepicaite (IMA2023-104), ideally $\text{Cu}_2^+(\text{N}_3\text{C}_2\text{H}_2)_2(\text{NH}_3)_2(\text{NO}_3)\text{Cl}\cdot 2\text{H}_2\text{O}$, was described from a guano deposit at Pabellón de Pica in Tarapacá, Chile. Pabellóndepicaite is the third triazolate mineral and 10th new mineral described from Pabellón de Pica, where an unusual suite of minerals has formed in a unique environment in which halite and a weathered chalcopyrite-bearing gabbro are found in proximity to a marine guano deposit. Type material is deposited in the collection of the Natural History Museum of Los Angeles County, California, U.S.A., with catalog number 76305. This small coastal mineral occurrence achieved notoriety following the publication of chanabayaite, ideally $\text{CuCl}(\text{N}_3\text{C}_2\text{H}_2)(\text{NH}_3)\cdot 0.25\text{H}_2\text{O}$ (IMA2013-065; Chukanov et al. 2015), which was named “Mineral of the Year” in 2015 by the IMA-CNMNC. Due to the dry environment, decomposition of avian organic material (guano, shells, bones, etc.) at Pabellón de Pica occurs slowly. In moist guano environments, nitrogenous materials are often washed away, leaving a primarily phosphatic residue (Košek et al. 2023).

* All minerals have been approved by the IMA CNMNC. For a complete listing of all IMA-validated unnamed minerals and their codes, see <http://cnmnc.units.it/> (click “IMA list of minerals”).

Allanite-(Sm), $(\text{CaSm})(\text{AlAlFe}^{2+})\text{O}[\text{Si}_2\text{O}_7][\text{SiO}_4](\text{OH})$

Allanite-(Sm), ideally $(\text{CaSm})(\text{AlAlFe}^{2+})\text{O}[\text{Si}_2\text{O}_7][\text{SiO}_4](\text{OH})$, is a new Sm-dominant member of the epidote supergroup from a serpentinite quarry hosting granitic pegmatite dikes located near Jordanów Śląski, Poland (Piecicka et al. 2024a). With the addition of allanite-(Sm), there are now La, Ce, Nd, Sm, and Y members of the allanite group. Based on the lanthanide chemistry of known minerals, Gd and Yb end-members may also exist; however, light rare earth element (i.e., La, Ce, Nd) enrichment is more commonly encountered than heavy rare earth element (i.e., Y and Yb) enrichment in allanite. Middle rare earth element enrichment to an extent that warrants species status is extremely rare among minerals. Allanite-(Sm) is only the sixth mineral described to date with a middle rare earth element as an essential, site-defining element. Like other members of the epidote supergroup, allanite-(Sm) is monoclinic with $P2/m$ symmetry. The cell parameters for allanite-(Sm) are $a = 8.8923(6)$, $b = 5.7005(3)$, $c = 10.1280(8)$ Å, $\beta = 115.445(9)^\circ$. Compared to the much more common group member allanite-(Ce) ($a = 8.927$, $b = 5.761$, $c = 10.15$ Å, $\beta = 114.77^\circ$, $V = 473.97$ Å³), the unit-cell volume of allanite-(Sm) (463.59 Å³) is only marginally smaller than that of allanite-(Ce), an effect of lanthanide contraction. Based on experimental data, the unit-cell volume of (La,Y)-allanite decreases as Y concentration increases (Affholter 1987). Allanite-(Sm) is the first silicate mineral with essential Sm and the first middle rare earth element silicate mineral to be described. As such, the combination of Sm and Si alone makes the formula for allanite-(Sm) a currently unique combination of elements (www.mindat.org, retrieved May 2024). The serpentinite quarry where allanite-(Sm) was discovered is also the co-type locality for another chemically unusual member of the epidote supergroup—the new Sc-bearing mineral heflikite (Piecicka et al. 2024b). Type material is deposited at the University of Wrocław Mineralogical Museum in Wrocław, Poland, with catalog number MMUWr IV8151.

RECENTLY PUBLISHED

This section includes some of the minerals approved in 2023 and 2024 that have been recently published (or entered press).

Heflikite, $\text{Ca}_2(\text{Al}_2\text{Sc})(\text{Si}_2\text{O}_7)(\text{SiO}_4)\text{O}(\text{OH})$

Heflikite, ideally $\text{Ca}_2(\text{Al}_2\text{Sc})(\text{Si}_2\text{O}_7)(\text{SiO}_4)\text{O}(\text{OH})$, is another new member of the epidote supergroup, also described from the serpentinite quarry near Jordanów Śląski, Poland (Piecicka et al. 2024b). Heflikite is the first Sc-bearing member of the epidote supergroup, and there are currently 23 minerals with essential Sc as of the time of writing. Heflikite occurs within granitic pegmatites that have intruded serpentinites of the Paleozoic-aged Ślęza ophiolite in the Bohemian massif. Sc-enriched epidote was first noted in scanning electron microscopy work in the late 1990s. More recent electron microprobe analyses identified Sc-rich

TABLE 1. New minerals approved by the IMA-CNMNC from January–March 2024^a

Mineral	Formula	IMA ^b	Space group	Type locality area	Country	New RN	New ST
Ferrimuirite	Ba ₁₀ (Ca ₂ Fe ³⁺) ₂ [Si ₆ O ₂₄]O ₂ Cl ₁₀	2023-100	<i>P4mm</i>	Gun claim	Canada	n	n
Pabellóndepicaite	Cu ₂ ²⁺ (N ₂ C ₂ H ₂) ₂ (NH ₃) ₂ (NO ₃)Cl·2H ₂ O	2023-104	<i>Pnna</i>	Pabellón de Pica	Chile	y	y
Tantaloeschynite-(Ce)	Ce(TiTa)O ₆	2023-058	<i>Pnma</i>	Huangshan pegmatite	China	n	n
Nipeite-(Ce)	Ce ₃ Fe ³⁺ (SiO ₄) ₆ [SiO ₃ (OH)](OH) ₃	2022-106a	<i>R3c</i>	Taiping	China	y	n
Nigelcookite	PbFe ²⁺ V ³⁺ (PO ₄) ₃ (OH) ₃	2023-113	<i>P2₁/m</i>	Yushui deposit	China	y	n
Plumbojohntomaite	PbFe ²⁺ Fe ²⁺ (PO ₄) ₃ (OH) ₃	2023-119	<i>P2₁/m</i>	Yushui deposit	China	n	n
Kvacekite	NiSbSe	2023-095	<i>P213</i>	Bukov mine	Czech Rep.	y	n
Karlleuite	Ca ₂ MnO ₄	2023-102	<i>I4/mmm</i>	Caspar quarry	Germany	y	–
Fluor-rewitzerite	[(H ₂ O)K]Mn ₂ (Al,Ti)(PO ₄) ₄ (OF)(H ₂ O) ₁₀ ·4H ₂ O	2023-115	<i>P2₁/c</i>	Hägendorf Süd pegmatite	Germany	n	n
Sperlingite	[(H ₂ O)K(Mn ²⁺ Fe ³⁺)(Al ₂ Ti)(PO ₄) ₄ [O(OH)]] [(H ₂ O) ₉ (OH)]·4H ₂ O	2023-120	<i>P2₁/c</i>	Hägendorf Süd pegmatite	Germany	y	–
Pfaffenbergitte	KNa ₃ (Al ₂ Si ₁₂)O ₃₂	2023-105	<i>P6/mmc</i>	Pfaffenberg	Germany	y	n
Moragite	Ca ₃ TiSi ₂ (Al ₂ Si)O ₁₄	2023-088	<i>P321</i>	Hartrurim basin	Israel	y	n
Yamhamelachite	KCrP ₂ O ₇	2023-103	<i>P21/c</i>	Hartrurim basin	Israel	y	–
Bacaferite	BaCaFe ₂ O ₈	2023-109	<i>P31m</i>	Hartrurim basin	Israel	y	y
Midbarite	Ca ₃ Mg ₂ (V,Si)O ₁₂	2023-110	<i>la3d</i>	Hartrurim basin	Israel	y	n
Shiranuiite	Cu ⁺ (Rh ³⁺ Rh ⁴⁺)S ₄	2023-072a	<i>Fd3m</i>	Haraigawa	Japan	y	n
Rinmanite-(Zn)	Zn ₂ Sb ₂ (Fe ³⁺ Zn ₂)O ₁₄ (OH) ₂	2023-107	<i>P6₃/mc</i>	Near Nežilovo	N. Macedonia	n	n
Cafeosite	Ca ₄ Fe ²⁺ Fe ³⁺ O ₅	2021-022a	<i>Cmce</i>	Dhofar 225 meteorite	Oman	y	–
Allanite-(Sm)	CaSm(Al ₂ Fe ²⁺)(Si ₂ O ₇)(SiO ₄)O(OH)	2023-114	<i>P2₁/m</i>	Jordanów serpentinite quarry	Poland	n	n
Fluor-rossmanite	□(Al ₂ Li)Al ₆ (Si ₆ O ₁₈)(BO ₃) ₃ (OH) ₃ F	2023-111	<i>R3m</i>	Krutaya pegmatite	Russia	n	n
Manganohatertite	NaNaCa(MnFe ³⁺)(AsO ₄) ₃	2023-098	<i>C2/c</i>	Tolbachik volcano	Russia	n	n
Vladkuzminite	K ₂ CuZn ₃ (AsO ₄) ₄	2023-106	<i>P2₁/n</i>	Tolbachik volcano	Russia	y	y
Geuerite	Ag ₂ Tl ₄ Pb ₄ As ₂₂ S ₄₀	2019-027a	<i>P2₁/c</i>	Lengenbach quarry	Switzerland	y	n
Giuschäite	Ag ₂ Tl ₄ Pb ₄ As ₂₀ Sb ₂ S ₄₀	2023-099	<i>Pn</i>	Lengenbach quarry	Switzerland	y	n
Reckibachite	Ag ₂ Pb ₁₂ As ₁₄ Sb ₄ S ₄₀	2019-071	<i>P2₁/c</i>	Reckibach	Switzerland	y	n
Rundqvistite-(Ce)	Na ₃ (Sr ₃ Ce)[Zn ₂ Si ₆ O ₂₄]	2023-043	<i>P2₁/c</i>	Dara-i-Pioz massif	Tajikistan	y	y
Fanguangite	(MoO ₄)(PO ₃ OH)·4H ₂ O	2023-112	<i>P1</i>	Freedom No. 2 mine	U.S.A.	y	y
Siligiite	[Pb(H ₂ O) ₅ (SO ₄)] ₂ [Zn ₆ (OH) ₁₈]	2023-117	<i>P2₁/n</i>	Redmond mine	U.S.A.	y	y
Ferriphoxite	[(NH ₄) ₂ K(H ₂ O)] ₂ [Fe ³⁺ (HPO ₄) ₂ (C ₂ O ₄)]	2023-096	<i>P2₁/c</i>	Rowley mine	U.S.A.	y	y
Carboferriphoxite	[(NH ₄)K(H ₂ CO ₃)] ₂ [Fe ³⁺ (HPO ₄)(H ₂ PO ₄)(C ₂ O ₄)]	2023-097	<i>P1</i>	Rowley mine	U.S.A.	n	y

Notes: The type locality names have been simplified for readability on a chart and are organized by type locality and country of origin. The “New RN” column conveys which mineral names introduce a new root name. The “New ST” column displays which minerals are new structure types. The dash symbol in the “New ST” column indicates cases where it is unclear if the structure is novel.

^a All minerals have been approved by the IMA-CNMNC. For a complete listing of all IMA-validated unnamed minerals and their codes, see <http://cnmnc.units.it/> (click “IMA list of minerals”). The data contained within this chart were derived from Newsletters 77 and 78 (Bosi et al. 2024a, 2024b); individual references for each mineral can be found within. ^b Published or in-press (as of May 2024).

zones within crystals that warranted its description as this new mineral. Pieczka et al. (2024) used focused ion beam (FIB) techniques to retrieve a foil of the Sc-rich zones for characterization. The structure of the heflkite holotype specimen was refined in space group *P2₁/m* with $a = 8.9383(9)$ Å, $b = 5.6830(5)$ Å, $c = 10.1903(10)$ Å, $\beta = 115.43(12)^\circ$. The holotype specimen is stored in the collections of the University of Wrocław Mineralogical Museum in Wrocław, Poland (catalog number MMUWr IV8120), and a co-type specimen is deposited in the collections of the Natural History Museum of the University of Oslo in Oslo, Norway, with catalog number KNR 44407.

Kvacekite, NiSbSe

Kvacekite, ideally NiSbSe, is a new selenide member of the cobaltite group from the Bukov Mine, Vysočina Region, Czech Republic (Pauliš et al. 2024). Kvacekite is isometric with *P2₁3* symmetry, $a = 6.0901(13)$ Å. Within the cobaltite group, the most direct chemical analog of kvacekite is its S analog, ullmanite (NiSbS). Prior to its discovery in nature, powder diffraction experiments on synthetic material had earlier described an ullmanite structure for NiSbSe (Foecker and Jeitschko 2001). Despite its chemical simplicity, kvacekite has a unique combination of essential elements among known minerals. In fact, minerals with any combination of Ni, Sb, or Se are uncommon. According to www.mindat.org (accessed May 2024), there are only 12 Ni-Se minerals, 18 Ni-Sb minerals, and 14 Sb-Se minerals (kvacekite is counted in all three metrics). Despite the chemical diversity within the cobaltite group, microprobe data indicate that the type material investigated by Pauliš et al. (2024) represents near-end-member kvacekite with an empirical formula of $(\text{Ni}_{0.95}\text{Cu}_{0.04}\text{Co}_{0.03})_{\Sigma 1.02}\text{Sb}_{1.00}(\text{Se}_{0.97}\text{S}_{0.01})_{\Sigma 0.98}$. Type material is stored in the collection of the National Museum, Prague, Czech Republic, with catalog number PIP 26/2023.

Bimbowrieite, NaMgFe³⁺(PO₄)₄(OH)₆·2H₂O

Bimbowrieite (IMA2020-006), ideally NaMgFe³⁺(PO₄)₄(OH)₆·2H₂O, is a new phosphate mineral in the dufrénite group discovered at the White Rock No. 2 quarry in South Australia, Australia (Elliott and Kampf 2024). Like other members of the dufrénite group, bimbowrieite is monoclinic with space group *C2/c*. The White Rock No. 2 quarry exposes a rare element enriched pegmatite hosting late-stage phosphate nodules. Primary magmatic apatite has been hydrothermally altered and weathered under acidic, oxidizing conditions to give rise to secondary phosphate minerals such as triplite. Bimbowrieite occurs alongside bermanite, ushkovite, sellaitite, and leucophosphite in seams within a triplite-apatite matrix. The White Rock No. 2 quarry is also the type or co-type locality for three other minerals (all phosphates): whiterockite, jahnsite-(NaMnMg), and magnesiobermanite. Bimbowrieite was named for the Bimbowrie Conservation Park. The park was, in turn, named after the old Bimbowrie sheep station. The conservation park was established by the government of South Australia in 2010 with ecological, historical, and geological conservation goals. Type material is stored with registration number G34867 in the collection of the South Australian Museum in Adelaide, Australia.

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