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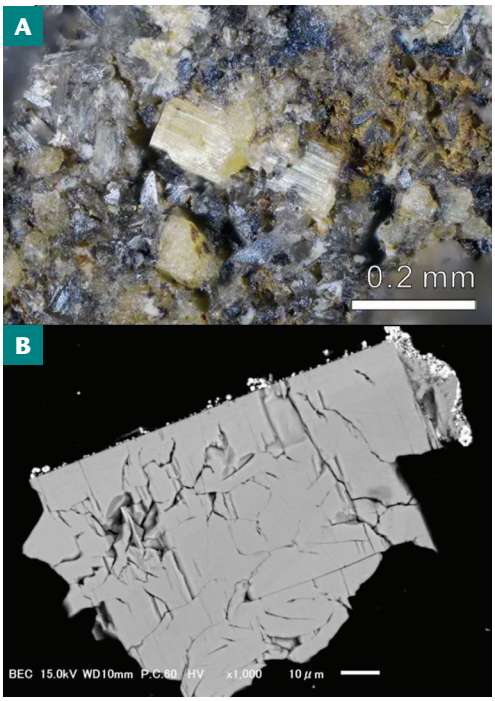
MIYAWAKIITE-(Y): MINERAL OF THE YEAR 2024

The 2024 "Mineral of the Year" award has been assigned to miyawakiite-(Y). The mineral was discovered in an abandoned pegmatite mine located at Suishoyama, Iizaka village, Kawamata, Date District, Fukushima Prefecture, Japan, and was fully characterized by a Japanese research team led by Daisuke Nishio-Hamane (Institute for Solid State Physics, University of Tokyo, Japan).



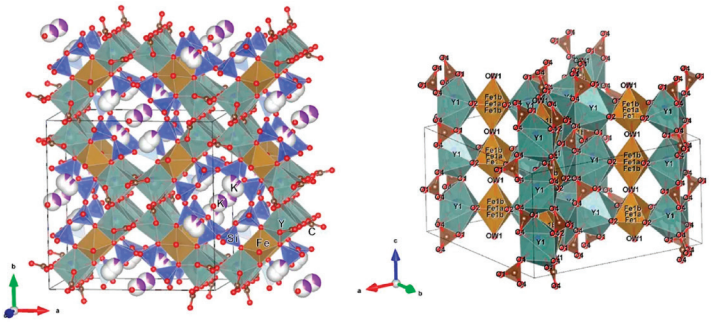
Microscopic photo (**A**) and back-scattered electron image (**B**) of miyawakiite-(Y). Reprinted from a publication of the Japanese Association of Mineralogical Sciences.

The pegmatite of the Suishoyama mine is rich in REE-bearing minerals, such as allanite-(Y) and britholite-(Y), plus carbonates such as caysichite-(Y) and tengerite-(Y). Miyawakiite-(Y) and the other carbonates occur as secondary minerals formed by supergene alteration of allanite-(Y) and britholite-(Y). Miyawakiite-(Y) is the third mineral having the Suishoyama pegmatite as the type locality, besides britholite-(Y) (1938) and iwashiroite-(Y) (2003). The approximate GPS coordinates are 37°40′ N, 140°37′ E.

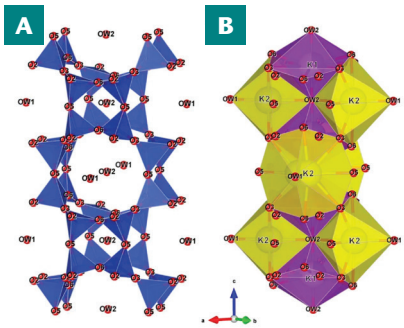
At the type locality, miyawakiite-(Y) occurs as thin plates or columnar crystals with a pale-yellow colour, transparent with a vitreous lustre, and dimensions typically ranging from 0.2 to 0.5 mm.

The ideal chemical formula of miyawakiite-(Y) is $\square Y_4Fe^{2+}{}_2(Si_8O_{20})(CO_3)_4(H_2O)_3$. In the empirical formula, K partially substitutes for vacancy, other REEs and Ca partially substitute for Y, and Mg and Mn^{2+} partially substitute for Fe^{2+}. Miyawakiite-(Y) is chemically related to caysichite-(Y), both being silicate minerals including REEs and carbonate groups. However, the two minerals have different crystal structures.

The unprecedented crystal structure of miyawakiite-(Y) has been solved and refined up to $R = 3.86\%$ in the tetragonal space group $I4/mcm$. Its unit cell parameters are $a = 17.53637(9)$ Å, $c = 9.55702(8)$ Å, $V = 2939.02(4)$ Å^3, $Z = 4$. The structure is quite unique: a Y- and Fe-centred polyhedral arrangement with CO_3 triangles forms a prismatic framework, with channels developing along the c axis. A SiO_4 tetrahedral network occurs in this channel, forming a zeolite-like framework with larger sites inside, mostly vacant and only partially occupied by K.



Crystal structure of miyawakiite-(Y). Reprinted from a publication of the Japanese Association of Mineralogical Sciences.



Zeolite-like channels of tetrahedra (**A**) and guest sites (**B**) in miyawakiite-(Y). Reprinted from a publication of the Japanese Association of Mineralogical Sciences.

The mineral took its name after Ritsuro Miyawaki (b. 1959), mineralogist at the National Museum of Nature and Science, Tsukuba, Ibaraki, Japan, for his lifetime contribution to systematic mineralogy, with a special attention to REE-bearing minerals. Ritsuro Miyawaki has described some 30 new mineral species and provided a tremendous service to the mineralogical community, serving as the national representative for Japan within the IMA Commission on New Minerals, Nomenclature and Classification, and in 2018–2022 as chair of the CNMNC. During his four-year term, he evaluated more than 500 proposals for new minerals.

The full description of the new mineral has been published in the *Journal of Mineralogical and Petrological Sciences* [Nishio-Hamane, D., Momma, K., Shimobayashi, N., Ohnishi, M., Kobayashi, T. (2024): Miyawakiite–(Y), $\square Y_4Fe_2(Si_8O_{20})(CO_3)_4(H_2O)_3$, a new mineral from Suishoyama, Kawamata Town, Fukushima Prefecture, Japan].

Link to the original article: https://www.jstage.jst.go.jp/article/jmps/119/1/119_240722/_pdf/-char/en.

ABOUT THE IMA MINERAL OF THE YEAR INITIATIVE

The *IMA Mineral of the Year* initiative was launched in 2014 and is coordinated by the Commission on New Minerals, Nomenclature and Classification (CNMNC) of the International Mineralogical Association. Each year, the title is awarded to one newly described mineral published within that year.

Selection is based on several key criteria, including:

- **Aesthetic appeal** – well-formed crystals and striking morphology
- **Unprecedented crystal structure** – novel arrangements not seen before
- **Unusual chemistry** – rare or unexpected combinations of chemical elements
- **Scientific relevance** – significance for mineral classification and Earth sciences more broadly

The initiative highlights outstanding new mineral discoveries. On average, more than 100 new mineral descriptions are published each year—105 in 2024 alone—making the selection of the Mineral of the Year especially competitive.