



Japan Association of Mineralogical Sciences

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JAPAN ASSOCIATION OF MINERALOGICAL SCIENCES AWARDEES

The Japan Association of Mineralogical Sciences (JAMS) is proud to announce the recipients of its 2011 society awards. The **Japan Association of Mineralogical Sciences Award** is given to a maximum of two scientists per year for exceptional contributions to the mineralogical and related sciences. The **Manjiro Watanabe Award**, named in honor of Professor Manjiro Watanabe, a famous Japanese mineralogist, and funded by his contribution, is presented yearly to a scientist who has contributed significantly to mineralogical and related sciences over his/her career. The **Japan Association of Mineralogical Sciences Research Paper Award** is given annually to the authors of two excellent papers in the *Journal of Mineralogical and Petrological Sciences (JMPS)* and *Ganseki-Kobutsu-Kagaku (GKK)* published in the last three years. Congratulations to all the winners!

Japan Association of Mineralogical Sciences Award to Tetsumaru Itaya



Tetsumaru Itaya, from Okayama University of Science, Japan, is a leading expert in the geochronology of orogenic belts around the world. His research spans a wide range of subjects, in addition to geochronology, including studies of volcanic, metamorphic, and plutonic rocks, accretionary complexes, and fault rocks for predicting earthquake activity; ore petrology and mineralogy; the development of high-quality analytical techniques; contributions to anthropology and archeology; and paleomagnetic studies related to global tectonics. Highlights of his recent research include the following:

- Discovery of a very large excess of argon in kyanite and of the regional excess argon wave occurring in a Barrovian-type metamorphic belt
- Elucidation of the mechanism underlying argon depletion from phengites during ductile deformation accompanying the exhumation of high-pressure metamorphic rocks and the formation of excess-argon-free phengites in ultrahigh-pressure metamorphism

His research has contributed to the understanding of orogenic processes around the world. The most challenging part of his research has been revealing the precise K–Ar chronology of Holocene volcanic rocks, which allows for dating island-arc volcanic rocks using a few grams of a sample with 2 wt% potassium, while applying a precise correction for the mass fractionation of argon isotopes.

Japan Association of Mineralogical Sciences Award to Kazumasa Sugiyama



Kazumasa Sugiyama, from the Institute for Materials Research (IMR), Tohoku University, Japan, is a mineralogist whose research concerns the development of new functional materials. He started his scientific career by focusing on the application of X-ray diffraction to the structural analysis of natural minerals with complex structures. His research interests also include the elucidation of the structure of amorphous materials.

Conventional X-ray diffraction has a drawback in that it is not useful for distinguishing between elements with similar atomic numbers. Kazumasa Sugiyama used anomalous X-ray scattering (AXS) to address the above-mentioned problem and obtained fine-structural information for materials with complex structures. This new

approach is one of the most promising methods for the structural analysis of disordered materials, including nanoscale natural minerals. He also developed new equipment for the fine-structural analysis of high-temperature liquids by energy-dispersive X-ray diffraction (EDXD), and he used the equipment to obtain structural images of a variety of liquid materials. Recently, he extended his research to the structural analysis of minerals with more complex structures. He also developed an advanced AXS-RMC (reverse Monte Carlo) method and solved the structures of complex and disordered materials. His research has contributed significantly to the advancement of fundamental Earth science knowledge and the development of new functional materials.

Manjiro Watanabe Award to Fumiyuki Marumo



Professor Fumiyuki Marumo started his scientific research studying the crystal structure of harmotome by single-crystal X-ray diffraction under the supervision of Prof. R. Sadanaga at the University of Tokyo in 1955. In 1961, he moved to the University of Bern in Switzerland and pursued structural research on sulfosalt minerals from Lengenbach. He solved many complicated structures and contributed to the determination of the structural scheme of arsenic-bearing sulfosalts. He also reported three new sulfosalt minerals from Lengenbach. He returned to Japan in 1966 and continued structural research at the Institute for Solid State Physics at the University of Tokyo. He was engaged in the structure determination of crystals of metal complexes, charge-transfer organic complexes, and natural organic materials, and he obtained valuable results in these fields. In 1972, he was offered a faculty position at the Tokyo Institute of Technology, where he started a structural investigation of crystals of ferroelectrics, ferroelastics, ionic conductors, transition metal silicates, etc. Most importantly, he confirmed the anisotropic distribution of 3d electrons, which was suggested by crystal-field theory, by determining accurate electron-density distributions in a series of spinel-type transition metal silicates using X-ray diffraction. This research attracted the attention of numerous inorganic crystal chemists. He also succeeded in growing high-quality nonlinear optical crystals of the low-temperature form of BaB₂O₄ from a supercooled melt of pure BaB₂O₄, by making the melt temperature about 100 °C higher than the phase transition point between the low- and high-temperature forms of BaB₂O₄.

JAPAN ASSOCIATION OF MINERALOGICAL SCIENCES RESEARCH PAPER AWARDS

Tetsuo KAWAKAMI and Tomokazu HOKADA (2010) Linking P-T path with development of discontinuous phosphorus zoning in garnet during high-temperature metamorphism—an example from the Lützow-Holm Complex, East Antarctica. *Journal of Mineralogical and Petrological Sciences* 105: 175-186



Tetsuo Kawakami



Tomokazu Hokada

Masayuki NISHI, Tomoaki KUBO and Takumi KATO (2009) Metastable transformations of eclogite to garnetite in subducting oceanic crust. *Journal of Mineralogical and Petrological Sciences* 104: 192-198



Masayuki Nishi



Tomoaki Kubo



Takumi Kato

THE DISCOVERY OF CHIBAITE

Koichi Momma, a mineralogist from the National Museum of Nature and Science, has found and described a new silica clathrate species, "chibaite," in collaboration with other members of JAMS. The new mineral incorporates hydrocarbon molecules such as CH₄, C₂H₆, C₃H₈, and *i*-C₄H₁₀ in its silica framework. In 1998, Chibune Honma, a fossil collector, discovered white quartz in tuffaceous sediments of Early Miocene age (Hota Group) in the southern Boso Peninsula, Chiba



Chibaite

Prefecture, Japan. Naoki Takahashi from the National History Museum and Institute, Chiba, analyzed the quartz specimen, which had an unusual, thick, hexagonal, platy shape; however, electron microprobe analysis revealed the presence of ordinary, simple silica. A few years later, Katsumi Nishikubo, a mineral collector from Chiba, collected more specimens. Masayuki Takada, a mineralogist from Kyoto, studied the crystal morphology of the distinctive quartz and revealed it to be a pseudomorph composed of {111} twins of octahedral crystals with cubic symmetry. Nishikubo sent some transparent euhedral crystals to Tohoku University, where Momma was studying silica minerals under the supervision of Toshiro Nagase and Yasuhiro Kudoh. Momma carried out Raman spectroscopic analyses on the crystals and detected methane and other hydrocarbons occluded in the crystals. X-ray investigations revealed that the crystal structure of Nishikubo's sample is different from that of melanophlogite, the only silica clathrate mineral hitherto known. Chibaite has been approved by the IMA Commission on New Minerals, Nomenclature and Classification (#2008-067) and is described in detail in Momma et al. (2011)¹.

Chibaite is isotopological to the cubic structure II gas hydrate. It is epitaxially intergrown with a minor amount of another, as-yet-unnamed silica clathrate mineral, which is isotopological to the hexagonal structure H gas hydrate. Chibaite is colorless, has a vitreous luster, and has no cleavage. Its refractive index, Mohs hardness, and calculated density are 1.470(1), 6.5–7, and 2.03(1), respectively. The empirical formula derived from the electron microprobe data is Na_{0.99}(Si_{134.53}Al_{1.63})O₂₇₂, excluding the guest gas molecules in the cages. These constituents comprise 90–92 wt% (average: 90.89 wt%), and the gas molecules comprise the remaining 8–10 wt%. Four types of hydrocarbons—CH₄, C₂H₆, C₃H₈, and *i*-C₄H₁₀—were confirmed from the Raman spectra. Raman



Koichi Momma (LEFT) and Katsumi Nishikubo

peaks attributable to other guest molecules, such as CO₂, N₂, or H₂S, were not detected. Therefore, the ideal formula of chibaite is SiO₂·n(CH₄, C₂H₆, C₃H₈, *i*-C₄H₁₀), with n_{max} = 3/17.

The Hota Group includes fore-arc sediments related to the Paleo-Izu arc deposited near the plate margin at the triple junction of the Pacific, Philippine Sea, and North America plates. Veins containing chibaite fill fissures related to minor faults, in which thermogenic hydrocarbons were deposited from fluids originating from deeply buried sediments. Silica clathrate minerals store hydrocarbons that have vanished from sedimentary rock and, therefore, provide new evidence for geological carbon cycling at active plate boundaries.

- 1 Momma K, Ikeda T, Nishikubo K, Takahashi N, Honma C, Takada M, Furukawa Y, Nagase T, Kudoh Y (2011) New silica clathrate minerals that are isostructural with natural gas hydrates. *Nature Communications* 2: 196 (7 pages)

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