Japan Association of Mineralogical Sciences

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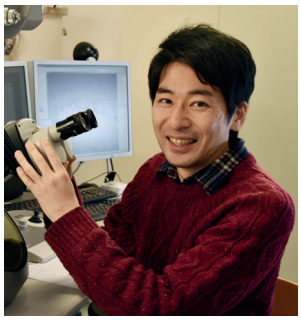
JAPAN ASSOCIATION OF MINERALOGICAL SCIENCES AWARDEES

The Japan Association of Mineralogical Sciences (JAMS) is proud to announce the recipients of its 2022 society awards. The JAMS Award for Young Scientists is awarded to two scientists who are under 37 years of age and have made exceptional contributions to mineralogical and related sciences. The JAMS Award for Applied Mineralogy is awarded to one scientist who has made a remarkable contribution to the field of applied mineralogy.

JAMS Award for Young Scientists to Naoki Nishiyama

Naoki Nishiyama is a research scientist at the Geological Survey of Japan of the National Institute of Advanced Industrial Science and Technology (AIST) (Japan). He obtained his PhD from Osaka University (Japan) under the supervision of assistant professor Tadashi Yokoyama and professor Satoru Nakashima. He is interested in mass transport and rock–water interactions in geological media. One of the most important achievements in the field of mass transport is the study of the relationship between permeability and pore structure. He compiled data from ~200 samples and showed that the "critical pore radius," which corresponds to the smallest radius of the widest flow path penetrating the medium, is a controlling factor of the permeability. Based on this result, he proposed an equation for predicting the permeability over a range of ~12 orders of magnitude. This study has been widely cited in various fields, including environmental, life, and material sciences. His pioneering work in the field of water–rock interaction is the study showing the importance of a "water film" in rock dissolution under unsaturated conditions, where water and air coexist in pores. He conducted flow-through experiments using saturated and unsaturated sandstone and found that the dissolution rates are almost the same under both states, indicating that even in air-filled pores, dissolution occurs through the water film covering the pore surfaces. He is now studying how pore structure and permeability are changed by CO_2–water–rock interactions during CO_2 capture and storage, and CO_2-enhanced geothermal systems in basalt. He has also begun studying CO_2 mineralization during enhanced rock weathering, which is a new technology for CO_2 negative emissions.

JAMS Award for Young Scientists to Toru Matsumoto



Toru Matsumoto is an assistant professor at the Hakubi Center for Advanced Research, Kyoto University (Japan). His work focuses on the chemical and physical modification of solid materials exposed to the space environment, commonly referred to as "space weathering." After participating in the initial analysis of regolith samples recovered from the asteroid Itokawa by JAXA's Hayabusa mission, he turned his attention to surface microstructures of regolith grains from airless bodies. Space weathering is mainly caused by the impacts of micrometer-sized meteorites and solar wind implantation. He showed that surface morphologies formed by space weathering can be observed by scanning electron microscopy. From the surface observation of Itokawa particles, he proposed that space-weathering processes affecting Itokawa would have developed with regolith activities under microgravity conditions. One of his notable discoveries is the selective loss of sulfur from the surface of iron sulfide on space-weathered Itokawa particles, resulting in the growth of metallic iron whiskers. Sulfur depletion on asteroids is a long-standing, yet unresolved phenomenon that is fundamental to the interpretation of the evolution of asteroid surface. Toru's discovery provided the clearest evidence for sulfur loss during long-term space exposure. Iron whiskers on iron sulfide are a novel and unexpected aspect of crystal growth on airless bodies. His research extended to lunar regolith particles, where he also identified iron whiskers similar to those on Itokawa. He proposed that sulfur compounds escaping from space-weathered iron sulfides could travel across the lunar surface, with some fraction eventually reaching the lunar polar ices, which are rich in sulfur. Toru has recently participated in the initial analysis of regolith samples recovered from the carbonaceous asteroid Ryugu. He has made significant contributions to unravelling the space weathering of hydrous minerals.

JAMS Award for Applied Mineralogy to Yuki Sugiura

Yuki Sugiura is a senior research scientist at Health and Medical Research Institute, AIST, Japan since 2022. He earned his bachelor's and master's degrees in crystal growth and mineralogy from Tohoku University (Japan). In March 2015, he earned his PhD degree in applied mineralogy at Waseda University (Japan). Since April 2015, he has worked as an assistant professor at the Faculty of Dental Science, Kyushu University (Japan). His expertise area lies in fine ceramic-based advanced biomaterials for bone regeneration in clinical operations. He is dedicated to addressing critical issues in clinical procedures, such as postoperative infections and low bone regeneration ability. Sugiura's strategy involves hybridizing drug and bone substitute materials using crystal engineering processes. He introduced a novel process of incorporating antibacterial drugs and bone growth factors, namely silver and silica, into octacalcium phosphate (OCP). The newly fabricated OCP-based bone substitutes have demonstrated excellent biocompatibility, bone regeneration ability, and antibacterial properties through animal experiments.

In addition to bone substitute fabrication, Sugiura has developed various dental materials, including dental implants and oral care products. He explores the interactions between minerals and biological entities, such as cells and tissues, at different scales. With this extensive knowledge, he has been working on a novel biomaterial fabrication, presenting biological phenomena related to biominerals, and creating new materials and ecosystems for a sustainable society.