International Mineralogical Association

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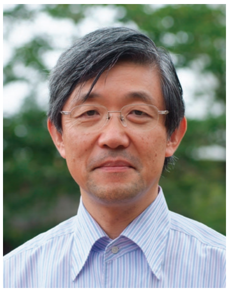
2019 IMA MEDAL TO EIJI OHTANI



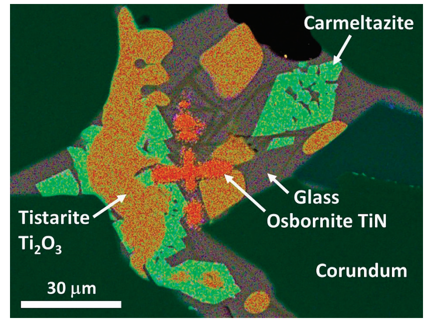
The International Mineralogical Association (IMA) is honored to present its 2019 Medal of Excellence in Mineralogical Sciences to Professor Eiji Ohtani. Professor Ohtani received his BSc degree in petrology in 1973 from Tohoku University (Japan). He received his MSc degree (1975) and his PhD degree (1979), both in geophysics, from Nagoya University (Japan). His professorial career began in 1980 at Ehime University (Japan), where he stayed until 1988. From then he continued at the Department of Earth and Planetary Materials Science at Tohoku University, from where he retired in 2016.

Professor Ohtani was the first person to perform successful melting experiments on minerals and rocks at $P > 10$ GPa using the then-revolutionary multi-anvil technology. He determined the precise melting relations of major mantle minerals, and he modeled phase relations at pressures equivalent to those of the uppermost lower mantle. He also invented techniques to measure density changes in molten rocks under very high pressures and used these techniques to constrain density contrasts between melts and minerals in the mantle. This pioneering work led to the development of the deep magma ocean model in 1985. Since the mid-1990s, Professor Ohtani has built an international reputation with his studies of water storage in the mantle. He measured the solubility of hydrogen in such nominally anhydrous minerals as olivine, majorite, and bridgmanite and demonstrated that the presence of water in mantle phases significantly affects their phase boundaries, something that could explain the topographic variations in the 410 km and 660 km seismic discontinuities.

In parallel with probing the mantle, Professor Ohtani actively explored the Earth's deepest interior and made impactful contributions on element partitioning between the mantle and core and on phase relations in the Fe–O (± Si, H, S) systems. In particular, his research demonstrated that both O and Si are the most likely light-element constituents in the outer core. In addition, his investigations of high-pressure polymorphism in shocked meteorites led to the discovery of coesite, stishovite, and seifertite (one of the densest SiO_2 polymorphs) in lunar materials, and of olivine breakdown to periclase plus bridgmanite in a shocked Martian meteorite. Professor Ohtani's publication record comprises over 360 peer-reviewed articles and is remarkable for its originality and influence.

Professor Ohtani has received a large number of honors, including the Mineralogical Society of Japan Award (1997), the Reimei Research Award from the Atomic Energy Research Institute of Japan (1998), the Norman L. Bowen Award (2007) from the American Geophysical Union, the Medal of Honor (Purple Ribbon) from the Government of Japan (2010), the Urey Award from the European Association of Geochemistry (2017), and the Humboldt Research Award (2017). He holds fellowships in the Mineralogical Society of America, American Geophysical Union, Geochemical Society, and European Association of Geochemistry, and has received many prestigious guest-, distinguished- and visiting-professor appointments, most recently as Distinguished Affiliated Professor at the University of Bayreuth (Germany) to run from 2016 to 2021.

MINERAL OF THE YEAR 2018



At long last, and after much deliberation, the IMA Commission on New Minerals, Nomenclature and Classification is pleased to announce its chosen Mineral of the Year 2018. The "race" was tight and there were many worthy contenders. But the winner is a true gem, or, at least, was presented as such in the media. The new complex oxide **carmeltazite ($ZrAl_2Ti_4O_{11}$)** forms black inclusions in blue corundum crystals ("Carmel Sapphire™") from Cretaceous pyroclastic rocks and associated alluvial deposits at Kishon Mid-Reach in northern Israel. Its name alludes to the type locality at Mt. Carmel and the three principal metals in its formula (Ti, Al and Zr). Carmeltazite was discovered by William L. Griffin (Macquarie University, Australia), Sarah E.M. Gain (University of Western Australia), Luca Bindi (Università degli Studi di Firenze, Italy), Vered Toledo (Shefa Gems Ltd., Israel), Fernando Cámara (Università degli Studi di Milano, Italy), Martin Saunders (University of Western Australia), and Suzanne Y. O'Reilly (Macquarie University). Since its description was published in *Minerals* (Griffin et al. 2018), the mineral has gained much publicity online as "the world's newest gemstone" (Andrews 2019), and even an "extraterrestrial mineral harder than diamonds" (Flatley 2019). Although perfectly terrestrial in origin and not particularly gemmy, the Mineral of the Year 2018 does contain Ti^{3+}, altogether rare in the geological environment, and possesses a peculiar crystal structure, which is remotely related to the close-packed arrangement of spinel. As can be seen from its formula, the structure of carmeltazite is cation- and anion-deficient relative to spinels, while its symmetry is reduced to orthorhombic. Perhaps even more remarkable than its public image or structure is the association of carmeltazite with other Ti^{3+} and carbide minerals, which indicates very unusual geological conditions in their volcanic cradle and promises new exciting discoveries in the future (Griffin et al. 2018).

We would also like to acknowledge here the close runners-up, which included the modular carbonate-phosphate-silicate aravaite from pyrometamorphic rocks of the Hatrurim Complex in Israel (Krüger et al. 2018) and the first-ever tin sulfate genplesite from the Oktyabr'skoe Cu–Ni–Pd–Pt deposit in Siberia (Russia) (Pekov et al. 2018). Once again, we congratulate Bill Griffin and his co-authors on their discovery and encourage all readers of *Elements* to find out more about this remarkable mineral from the *Minerals* article.

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