International Mineralogical Association

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2022 IMA MEDAL OF EXCELLENCE TO PATRICIA M. DOVE

The IMA is delighted to present its 2022 Medal of Excellence to Patricia M. Dove, Distinguished Professor and C.P. Miles Professor of Science at Virginia Polytechnic Institute and State University, USA. She has been praised as a "world leader in the field of mineral reactivity and biomineralogy" and a pioneer who "has combined key advances and development of new techniques at the atomic level with major insight into large scale processes including the long-term evolution of biomineral systems."

Patricia completed her BSc. and M.Sc. studies at Virginia Tech, USA (1981 and 1984, respectively) and earned her doctoral degree from Princeton, USA, in 1991. In the past 30 years, she has built an impressively successful research career at the crossroads of mineralogy, aqueous geochemistry, biochemistry, surface physics, and environmental science—first at Georgia Tech and since 2000 at Virginia Tech. Recognizing the critical role of interaction between rocks and biota in the critical zone, Professor Dove embarked on studying some of the least-understood aspects of that interaction, including the atomic-scale kinetics and molecular dynamics of dissolution and precipitation at mineral surfaces, and focused her research efforts on biologically relevant systems (quartz, amorphous silica, calcite, and amorphous $CaCO_3$). She pioneered the use of atomic force microscopy (AFM) for in-situ molecular imaging to observe crystal growth and resorption under carefully controlled conditions (Dove and Hochella 1993; Dove and Platt 1996). The parameters of these experiments ranged from ambient temperature and pressure to methodologically challenging simulated environments, which required ingenious experimental apparatus, such as a hydrothermal mixed-flow reactor for direct measurements of reaction rates at steady-state conditions (Dove and Crerar 1990) and fluid-tapping AFM for studying microbial interactions with minerals (Grantham and Dove 1996). This work was foundational to constraining the effects of physico-chemical parameters on the kinetics of crystal growth and dissolution, and to the development of quantitative molecular models describing these processes in surficial, hydrothermal and bio-mediated environments (e.g., Dove, 2010; Dove et al., 2008, 2019). Another important outcome of Professor Dove's research was the collaborative discovery of crystallization by particle attachment (De Yoreo et al. 2015). This "non-classical" crystallization mechanism has since been documented increasingly in synthetic and natural systems, yielding over 170 citations of the original publication annually! These papers have far-reaching implications, not only for our understanding of how minerals form and dissolve but also for the interpretation of rock textures, paleoclimate reconstructions, evolutionary biology, and such practically important areas as nanotechnology and crystal design. Professor Dove's outstanding contribution to science has been recognized through many awards and honors, including the F.W. Clarke Medal from the Geochemical Society (1996); Dana Medal from the Mineralogical Society of America (2014); fellowships with the Mineralogical Society of America (2000), American Geophysical Union (2008), and Geochemical Society (2010); and the US Department of Energy Best University Research Award (1999 and 2005).

Professor Dove is an award-winning educator and promoter of science, who has shared her passion for biomineralogy with hundreds of university and school students through the National Science Foundation programs, Virginia Tech's CurVinci Living Learning Communities, Kids Tech, and other outreach platforms. At Georgia and Virginia Techs, she has developed and taught an impressive spectrum of courses, from *Resources of the Earth* to *Oceanography* and *Biomimetic Materials and Design*.

We congratulate Professor Dove on this prestigious award and look forward to reading about her new exciting discoveries in biomineralogy and beyond!

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MINERAL OF THE YEAR AWARD

The IMA is pleased to announce that for 2021, the "Mineral of the Year" award has been assigned to **seaborgite**. The mineral was found and fully characterized by a research team led by Anthony R. Kampf, from the Mineral Sciences Department of the Natural History Museum of Los Angeles County, Los Angeles, California, USA (Kampf et al., 2021).

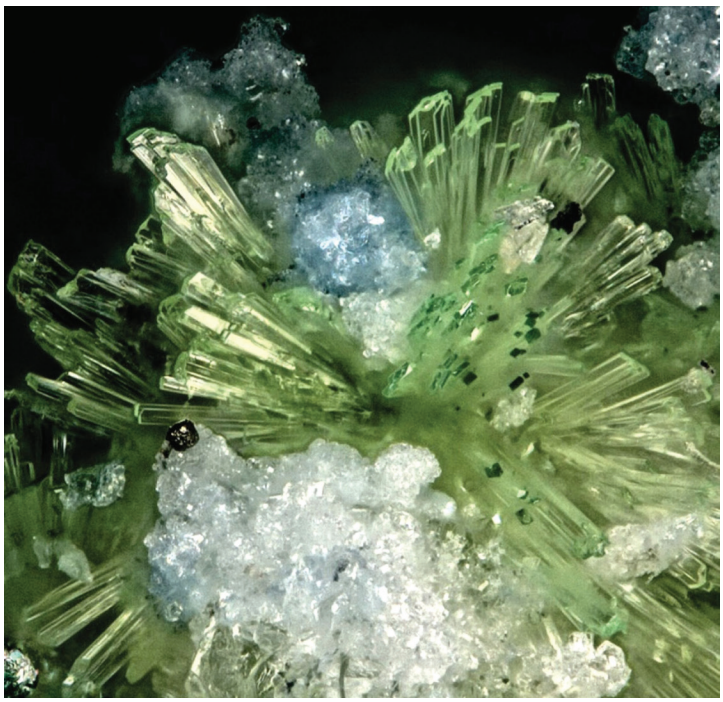

Figure 1 Diverging group of bladed seaborgite crystals (associated with ferrinatrite)

Seaborgite was found in the Blue Lizard mine, Red Canyon, White Canyon District, San Juan Co., Utah, USA, where it occurs on a thick crust of gypsum overlaying a matrix comprising mostly quartz. Associated phases are copiapite, ferrinatrite, ivsite, metavoltine, römerite, and other currently unknown minerals. Seaborgite occurs as attractive bladed crystals of light-yellow color up to 0.2 mm in length. Crystals typically occur in radiating sprays (FIG. 1). The ideal chemical formula of seaborgite is $LiNa_6K_2(UO_2)(SO_4)_5(SO_3OH)(H_2O)$; hence, it is an uranyl sulfate mineral. Seaborgite is the only known mineral species containing both Li and U as species-forming elements, and it is also one of very few minerals containing three distinct alkali metals.

Seaborgite is triclinic, with space group $P\bar{1}$, and unit cell parameters a = 5.4511(4) Å, b = 14.4870(12) Å, c = 15.8735(15) Å, α = 76.295(5)°, β = 81.439(6)°, and γ = 85.511(6)°. Its crystal structure has been determined by single-crystal X-ray diffraction methods to R = 3.77%. The structure of seaborgite is new and unprecedented, although it is based on the same uranyl sulfate cluster that is topologically identical to the one in the crystal structure of bluelizardite.

The mineral was named after Glenn Seaborg (1912–1999), an American chemist who was involved in the synthesis, discovery, and investigation of ten transuranium elements, including seaborgium. These studies led him to win the 1951 Nobel Prize in Chemistry.

Seaborgite is the third "Mineral of the Year" with its type locality in the USA. The previous winners were ophirite (2014, from the Ophir mine in Utah) and rowleyite (2017, from the Rowley mine in Arizona). The Blue Lizard mine was a prolific mineralogical site and the type locality for 22 other mineral species besides seaborgite.

The full description of the new mineral is available courtesy of the American Mineralogist from https://pubs.geoscienceworld.org/msa/ammin/article/106/1/105/593632/Seaborgite-LiNa6K2-UO2-SO4-5-SO3OH-H2O-the-First?guestAccessKey=195c8c0d-8405-407e-8990-0f002e75bade

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APPLIED GEOCHEMISTRY EXCELLENCE IN REVIEW AWARDS

Since the founding of *Applied Geochemistry* in 1986, many outstanding reviewers have helped shape our Society's journal and our success as a Society. We are indebted to those contributions, and starting last year, we began highlighting the reviewers who deserve extra recognition. The editorial board of *Applied Geochemistry* launched our annual "Excellence in Review Award" to recognize the dedicated community of expert reviewers inside and outside of our organization. We offer a big THANK YOU to all our awardees, and congratulations!

Marc Aertsens – Institute for Environment, Health and Safety, Belgian Nuclear Research Centre, Belgium

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