American Mineralogist, Volume 87, pages 794, 2002

Presentation of the Mineralogical Society of America Award for 2001 to Peter Burns

FRANK C. HAWTHORNE

Geological Sciences, University of Manitoba, Winnipeg, Manitoba R3T 2N2 Canada

Mr. President, guests, and members of the Society:

I am delighted to present my friend and colleague, Peter Burns, as this year's recipient of the Mineralogical Society of America Award.

Peter did his undergraduate work at the University of New Brunswick, with an undergraduate thesis on the borate minerals from Sussex County, New Brunswick. Stemming from this work, he found and described a new borate mineral, trembathite, which he named after Lowell Treembath, his professor in Mineralogy. He did his M.Sc. with Mike Fleet at the University of Western Ontario, working on the ordering of gallium in synthetic gallium albite, using crystal-structure refinement and MAS NMR spectroscopy.

Peter started his Ph.D. at the University of Manitoba in 1990, nominally under my supervision, but actually he didn't need any. His Ph.D. work involved ab initio Hartree-Fock calculations to quantitatively understand the stereochemical implications of the Jahn-Teller effect in copper minerals, together with extensive work on electron-phonon-modulated second-order phase transitions in Mg-Cu solid solutions. However, Peter also did many side projects, and graduated with 29 papers submitted, in press, or published. On leaving Manitoba, Peter went to Cambridge to work with Michael Carpenter on phase transitions in boracite-group minerals, developing skills in TEM and high-temperature infrared spectroscopy. Peter has done extensive field and laboratory work on the New Brunswick borate deposits in eastern Canada, and he had the idea to characterize the phase-transition-induced microstructures in boracite-group minerals as a function of temperature to use them as a geothermometer to indicate the sedimentary or metamorphic origin of complex borate deposits.

His second post-doctoral year was spent at the University of New Mexico under the heel of current MSA President Rod Ewing, where he focused on developing a structural hierarchy for hexavalent-uranium minerals. The resulting paper won the Hawley Medal of the Mineralogical Association of Canada. In addition, they also looked at the stereochemical mechanisms whereby actinide elements are incorporated into U^{6+}-oxysalts, a pioneering piece of work on the factors affecting the dispersal of actinides in the environment.

Peter went on to the University of Illinois for a year, and there he rapidly became an expert in the use of the CCD detector, and pioneered its use in mineralogy. After a year, Peter took up a permanent position at Notre Dame, where he has established an X-ray diffraction lab and a synthesis lab for U^{6+}-oxysalt compounds. His principal effort is focused on the U^{6+}-oxysalt minerals, specifically to develop a coherent understanding of the structures of these minerals, and how their stabilities, properties, and occurrence are related to their structures. This is an extremely ambitious area of research, and Peter is making great strides almost every week.

Uranyl minerals form in soils contaminated with actinides and are prominent alteration phases in laboratory experiments on UO_2 and spent nuclear fuel subjected to oxidative dissolution. It is likely that they will impact upon release rates of radionuclides from spent nuclear fuel in a geological repository by directly incorporating some of the radionuclides into their crystal structures. Uranyl minerals also form due to the alteration of actinide-bearing borosilicate waste glasses, and may also affect the release of radionucludes from such waste forms. Peter Burns has made major progress in the past few years toward understanding the uranyl minerals, particularly with regard to their behavior in the surficial environment.

While a graduate student, Peter won the MSA Research Award in Crystallography and was the first mineralogist to win the ICDD Scholarship. In 1997, Peter (together with Mark Miller and Rod Ewing) won the Hawley Medal of the Mineralogical Association of Canada for their paper on a Structural Hierarchy for U^{6+}-oxysalts. In 1998, Peter won the Young Scientist Award of the Mineralogical Association of Canada, and in 1999, he won the Donath medal (Young Scientist Award) of the Geological Society of America (and again, he was the first mineralogist to do so).

Peter Burns is an exceptional scientist. He is extremely intelligent, works incredibly hard, and has scientific insight exceptional in one so young. He has accomplished an amazing amount of original work in a wide variety of areas, from fieldwork to ab initio molecular-orbital calculations. Peter has all of the tools of the chemist and physicist, but he is a geologist, with the geologist's understanding of complex natural systems. He has already made major contributions to several areas of mineralogy in the broadest sense, and I have no doubt that this will continue for a long time to come.

Ladies and gentlemen, I take great pleasure in presenting to you, Peter Carmen Burns, winner of this year's MSA Award.

0003-004X/02/0506–794$05.00