

SCIENTIFIC EDITORS

MICHAEL F. HOCELLA JR., Virginia Tech, USA (hochella@vt.edu)
 IAN PARSONS, University of Edinburgh, UK (ian.parsons@ed.ac.uk)
 E. BRUCE WATSON, Rensselaer Polytechnic Institute, USA (watsoe@rpi.edu)

ADVISORY BOARD

PETER C. BURNS, University of Notre Dame, USA
 RANDALL T. CYGAN, Sandia National Laboratories, USA
 ROBERTO COMPAGNONI, Università degli Studi di Torino, Italy
 ADRIAN FINCH, University of St Andrews, UK
 BICE FUBINI, Università degli Studi di Torino, Italy
 MONICA GRADY, The Natural History Museum, UK
 JOHN E. GRAY, US Geological Survey
 ALAIN MANCEAU, CNRS, Grenoble, France
 DOUGLAS K. McCARTY, Chevron Texaco, USA
 KLAUS MEZGER, Universität Münster, Germany
 JAMES E. MUNGALL, University of Toronto, Canada
 TAKASHI MURAKAMI, University of Tokyo, Japan
 HUGH O'NEILL, Australian National University, Australia
 NANCY ROSS, Virginia Tech, USA
 EVERETT SHOCK, Arizona State University, USA
 NEIL C. STURCHIO, University of Illinois at Chicago, USA
 JOHN W. VALLEY, University of Wisconsin-Madison, USA
 DAVID J. VAUGHAN, The University of Manchester, UK

EXECUTIVE COMMITTEE

JEREMY B. FEIN, Geochemical Society
 DANIEL J. KONTAK, Mineralogical Association of Canada
 JOHN M. HUGHES, Mineralogical Society of America
 CATHERINE MEVEL, Société Française de Minéralogie et de Cristallographie
 CLIFF JOHNSTON, The Clay Minerals Society
 ERIC H. OELKERS, European Association for Geochemistry
 RUSSELL S. HARMON, International Association of GeoChemistry
 PETER TRELOAR, Mineralogical Society of Great Britain and Ireland

MANAGING EDITOR

PIERRETTE TREMBLAY
 tremblpi@ete.inrs.ca

EDITORIAL OFFICE

Université du Québec
Institut national de la recherche scientifique
 Eau, Terre et Environnement

Natural Resources Canada / Ressources naturelles Canada
 Geological Survey of Canada / Commission géologique du Québec
PARTNERS OF THE QUÉBEC GEOSCIENCE CENTRE

490, rue de la Couronne
 Québec (Québec) G1K 9A9 Canada
 Tel.: 418-654-2606
 Fax: 418-654-2525

Layout: POULIOT GUAY GRAPHISTES
 Technical editor: THOMAS CLARK
 Copy editor: DOLORES DURANT
 Printer: CARACTÈRA

The opinions expressed in this magazine are those of the authors and do not necessarily reflect the views of the publishers.

www.elementsmagazine.org



E. Bruce Watson

Advising Future Scientists

This issue of *Elements* was already on track when I joined the editorial team, but it is the first issue for which I've played the role of principal editor. The experience has been interesting and enjoyable, and in some respects a trip

down memory lane. Unbeknownst to most, I seriously considered a career in glass science (in industry) after finishing my PhD. My doctoral research on silicate melts had exposed me to the glass-science literature, and I was fascinated not only by the breadth and challenges of the field but also by its technological relevance. I have no regrets about having stayed in academia, but the reflections triggered by working on this issue made me realize that my career choice was somewhat accidental, having hinged on a critically timed postdoc offer from the Geophysical Laboratory. I was also reminded while working on this issue of the varied employment opportunities available to individuals holding PhDs in mineralogy, petrology, or geochemistry (MPG). These musings—and my continuing role as an advisor to graduate and undergraduate students—led to thoughts about advising future scientists in a sociopolitical climate not favorable to the basic sciences.

Funding for basic geoscience research in the U.S. and worldwide is currently very limited. This situation inevitably affects the everyday lives and careers of those of us who depend upon funding from government agencies to conduct research. Unfortunately, it also affects students, both directly, because we depend on contracts and grants to support them, and indirectly, because they detect the stress to the system and develop concerns about their own career choices and employment prospects. In this difficult climate, our advice to students considering careers in the geosciences becomes particularly important, whether they are beginning undergraduates or PhD candidates nearing degree completion.

First and foremost, we in the geosciences must not abandon our enthusiasm for our field or our efforts to inspire and encourage young people, directly and by example, to enter our profession. Even fleeting exposure to the news media will drive home the message that environment and energy are prominent national and global concerns, and the challenges in these fundamentally Earth-science areas are with us to stay. There are many roles for well-qualified MPG graduates in academia, government, and industry in addressing these challenges, so employment prospects are reasonably good if individuals are flexible about the nature and location of their employment. That said, I don't think we should sell our science as a ticket to a job; rather, we should encourage nascent scientists at the undergraduate level to

"be all they can be," but at the same time not mislead them about the realities of the job market. The inspiration side of the picture is vitally important, too, because students who are passionate about their chosen field will do better at every level. I've known a few undergraduates who became inspired long before they enrolled in university—either by a "life-altering" observation (the Jupiter system through a telescope; the perfection of a natural crystal) or by a big, unanswered question (Is there life beyond our world?). Such students are relatively rare, especially at a practical place like Rensselaer. The more-typical potential geoscientist might be a student who likes science in general but hasn't yet been inspired. Perhaps here we can do our jobs best by teaching what we've learned about the Earth (and the methods we use) while at the same time emphasizing what we don't know yet. This approach might help a student see a place for him- or herself in working on or solving the important unanswered questions.

By definition, graduate students in MPG have already chosen an area of specialization in science, so here the question is how to help them maintain their enthusiasm, maximize their opportunities, and generally be successful in their career paths. With my own students, I try from the outset to convey my personal belief that "success" comes in many forms, and that they don't have to be clones of myself (in terms of career choice) to be successful in my eyes—or their own. What is important is that potential PhD recipients learn how to think and work independently, to evaluate their own work and that of others with a critical eye, to conceive and design new research projects, and to take the next step in an effort already underway. There is nothing unusual in these words (most PhD guidelines probably use similar language), but the skills acquired to achieve the stated objectives can be applied in a wide range of arenas, well beyond the walls of academia. The effectiveness of these skills on the job market can be maximized by gaining interdisciplinary exposure during the graduate education process through cross-departmental coursework or research. For MPG students, glass science is not a bad option (as the articles in this issue make clear), and exposure to materials science in general is invaluable, especially if you can get the prefix "nano" on your academic transcript.

If I were to presume to advise students (other than my own!) in advanced-degree programs, I would say something like this: Pursue your graduate career with passion, determination, and an intellectually adventurous attitude. If you're interested in basic research, be aware of the limited funding opportunities for "non-applied" science, but don't be dismayed by the situation—it is likely to change, and even today people with good ideas who persevere do obtain funding. The approaching criticality of

Cont'd on page 260

What's New?

Several societies have expressed interest in participating in *Elements* and we expect that at least three become participating societies in 2007. Watch the next issue for an announcement. Our line-up for 2007 is complete—we will publish a 2007 preview in the December issue—and we are now discussing potential topics for 2008. Suggestions and proposals are always welcome.

Elements at IMA meeting

The International Mineralogical Association held its quadrennial meeting in Kobe, Japan, last July (see pages 316 and 317). *Elements* was present in the exhibit hall, thanks to the hard work of Adrian Lloyd-Lawrence, executive director of the Mineralogical Society, and the help of several members of participating societies. We are grateful for the presence at the stand of Vicki Loschiavo (MAC), John Rakovan (MSA), Barb Dutrow (MSA), Herta Effenberger (EMU), and MinSoc members Michele Warren (Manchester University) and Mark Welch (NHM). Adrian made all the arrangements and managed the stand. He reports the following.

Part of the IMA conference was an exhibition held in the main conference centre. Participating in this display of stands were 28 organisations, from booksellers through instrument manufacturers to consultancy services. The *Elements* magazine consortium of eight participating societies mounted a stand which was managed by the Mineralogical Society. As anticipated there was much interest in this relatively new publication which has been highly acclaimed internationally, and over a hundred sample copies were taken by interested conference delegates.

Cont'd from page 259

Advising Future Scientists

environment and energy issues will ensure future jobs in academia, government, and industry, and the versatility of individuals holding advanced degrees in MPG areas will make them competitive.

I believe that the future of the MPG sciences is very bright in spite of the present funding climate for basic science. As a more-or-less cognizant MPG practitioner for over two decades, I can say without hesitation that at no previous time has there been so much excitement in our field. Biogeochemistry and nanogeochemistry (and their environmental impacts) are important thematic foci, but advances in analytical instrumentation are driving revolutions in our understanding of element cycling and the evolution of geochemical systems at a number of scales. Some of the stories have already been told in the pages of *Elements*, and there are many in store for the future.

E. Bruce Watson
Watsoe@rpi.edu



Adrian Lloyd-Lawrence and Vicki Loschiavo at the *Elements* stand

Multi-Society Catalogue

With this issue of *Elements*, you will find enclosed our 2007 multi-society catalogue. Please keep it, or forward it to a colleague, a student, or your library. If each of you encouraged a colleague or a student to join one of the participating societies, the mineralogy-geochemistry-petrology community would double instantly. Imagine our impact! Membership in any of the participating societies includes a subscription to *Elements*. *Elements* offers participating societies a way to promote their publications to a wider audience than

their own membership, and this year seven of the societies "bought" pages of the catalogue.

Libraries and Elements

We remind you that corporate subscribers to *American Mineralogist*, *The Canadian Mineralogist*, *Clays and Clay Minerals*, *Mineralogical Magazine*, and *Clay Minerals* receive *Elements* as part of their subscription to these journals. Thus if a library subscribes to one or several of these journals, it is entitled to one copy of *Elements* (it might receive multiple copies in instances where we have not been able to eliminate duplicates). The societies producing these journals pay a fee per subscriber to allow libraries to receive *Elements*. Make sure your librarian knows about *Elements* and ensure it is prominently displayed. If your library does not receive any of the journals mentioned above, it can subscribe to *Elements* at a cost of USD\$125 a year in 2007. We hope that small colleges and community libraries will subscribe to *Elements* to enlarge their mineralogy and geochemistry content. They can do so through their book agents or by contacting the managing editor (ptremblay@inrs.etc.ca).

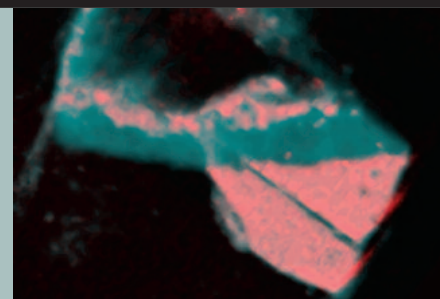
Thanks

To guest editors Grant Henderson, Georges Calas, and Jonathan Stebbins, and the authors who contributed papers to this issue; to the society news editors of the participating societies; and to the other contributors to this issue, Jean Bédard, Henry L. Ehrlich, Peter Heaney, Andrea Koziol, and Takamitsu Yamanaka.

WATCH FOR OUR NEXT ISSUE**Environmental Impact of the Nuclear Fuel Cycle**

GUEST EDITOR: Rodney C. Ewing
(University of Michigan)

As the world faces the consequences of global warming caused by the use of fossil fuels, there has been a resurgence of interest in nuclear power. However, there is no "silver bullet", and each energy-producing system produces waste. This issue of *Elements* will explore the interface between mineralogy and geochemistry and potential means to reducing the impact of radioactive waste from the nuclear fuel cycle.



Nuclear power and the nuclear fuel cycle
Rodney C. Ewing (University of Michigan)

Uranium mineralogy and its impact on neptunium mobility under oxidizing conditions

Peter C. Burns and Amanda L. Klingensmith
(University of Notre Dame)

Spent nuclear fuel
Jordi Bruno (Enviros, Barcelona)

Nuclear waste glass
Bernd Grambow (Subatech Laboratory, Nantes)

Ceramic waste forms for actinides
Gregory Lumpkin (University of Cambridge)

Uranium mine and mill tailings
Abdesselam Abdelouas
(Subatech Laboratory, Nantes)