THIS ISSUE

This issue on mine wastes is most timely and well illustrates a conundrum faced by our society: we consume more and more resources, and at the same time we condemn the exploitation, and sometimes even the exploration, of these same resources. On the news recently were stories about protests against the proposed construction of the Keystone XL pipeline (to transport oil from the Alberta oil sands to several locations in the United States), and against the exploitation of the Alberta oil sands in general. As Kim Kaspersky and Randy Mikula explain in their article, Alberta sits on enormous oil resources in its oil sands. Their exploration and exploitation have created great wealth and have contributed significantly to this Canadian province's booming economy. But the benefits have come at an environmental cost, with increasingly stiff opposition from environmental groups and the public.

ABOUT THEMATIC ISSUES

It's hard to believe, but with this issue we have covered 41 topics in the Earth sciences. Some issues have been devoted to single minerals (diamond, zircon, bentonite, gold), elements (arsenic, platinum-group elements, sulfur), societal issues (e.g. global water sustainability), and frontier topics (e.g. mineral magnetism, cosmochemistry) of wide appeal to our community. The skeptics who pronounced that we would soon run out of topics have worried needlessly: 2012 is fully booked (see our preview in the next two pages), some topics are already slated for 2013, and there is a steady stream of interesting proposals coming our way.

Elements has been fortunate to count on 10 highly prominent members of our community who have gladly accepted the challenge of a three-year term as principal editor: Rod Ewing (2005), Mike Hochella (2005–2006), Ian Parsons (2005–2007), Bruce Watson (2006–2008), Susan Stipp (2007–2009), David Vaughan (2008–2010), Hap McSween (2009–2011), Tim Drever (2010–2012), Georges Calas (2011–2013), and John Valley (who will officially start his term in 2012). These individuals have been responsible for steering *Elements* during its growing years.

A question the editors were asked frequently at Goldschmidt 2011 in Prague was "What percentage of proposals is accepted?" Very few proposals are actually turned down—most proposals have merit—but very few are accepted as is. Once we receive a proposal, a dialogue starts that might lead to several revisions before the proposal is accepted. The most common request from the editors is to enlarge the scope of the proposal to take into account *Elements*' broad audience. Sometimes we will say, "Not at this time; please consider resubmitting in a couple of years," in order to let a frontier field mature.

How long does it take before an issue is slated? At least a year and a half—a comfortable amount of time to schedule an issue and work through all the steps. But it might take up to three years if we have to wait for the right timing to schedule an issue. In a one-year lineup, we strive to include a mix of mineralogy, petrology, and geochemistry topics. Potential guest editors (i.e. proposers) often send out a "feeler" e-mail asking, "Would you be interested on an issue devoted to topic X?" Early dialogue with the editors can be very helpful and can ensure the success of a proposal with a minimum amount of revision. So some advice for proposers is this: If you are interested in being guest editor for an issue, send your proposal promptly. Remember that your proposed issue might be scheduled two or three years later. The more lead time you have, the more likely it is that you will be able to get your first choice of authors.

As editors, we try to nurture the guest editors and impress on them the need for broad representation in terms of authorship, geography, and gender. Most of the themes covered in *Elements* have been the subject of review volumes, special journal issues, or textbooks. In *Elements*, guest editors are allotted 36 pages of thematic content. They therefore need to choose a focus, an angle. We also ask them to cover the topic in 5 papers, along with a more general introductory article that sets the stage and perhaps fills in briefly on some aspects not covered in the other papers. Every expert on a given topic would probably choose a different focus for an issue.

From time to time, we are asked why Dr. So-and-so, a world-class specialist on a given topic, is not an author. Perhaps Dr. So-and-so was approached but could not fit the writing into his or her busy schedule. We ask guest editors to distribute authorship geographically and to look for persons best able to write for a broad audience. We also ask that papers have no more than 3 authors and ideally 1 or 2 authors, giving 18 authors at most per issue. With all these constraints, it is unlikely that all leaders in a given field can be authors.

Are there specific themes we would like to see published for which we have received no proposal? Yes—we would like to include an "Ocean" issue in our 2013 lineup. If you have ideas for such an issue, please contact Tim Drever (drever@uwyo.edu) with your suggestions.

Pierrette Tremblay, Managing Editor

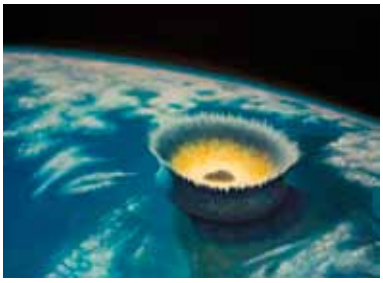
THEMATIC TOPICS IN 2012

Volume 8, Number 1 (February)

IMPACT!

GUEST EDITORS: **Fred Jourdan** (Curtin University) and **Wolf Uwe Reimold** (Humboldt University Berlin)

Impact processes are central to the formation and evolution of the Solar System and the modification of planetary surfaces. On Earth, asteroid impacts played a critical role during Earth history; they delivered the constituents of our planet, were responsible for the formation of major ore deposits, and affected life on Earth. Studying impacts and their effects is a very active field at the crossroads of many scientific disciplines, from mineralogy to environmental science. This issue will focus on the mineralogical, geochemical, and petrological aspects of terrestrial impact structures, and in particular on the latest developments in the relevant fields.



Artist's view of a large terrestrial impact event. PAINTING BY DONA JALUFKA, AUSTRIA

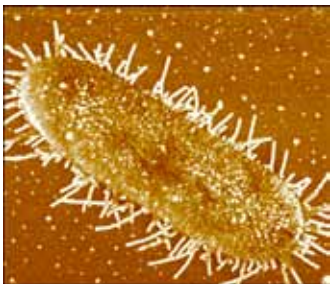
- **Impact!**
  Wolf Uwe Reimold (Humboldt University Berlin) and Fred Jourdan (Curtin University)
- **The impact cratering process**
  Gareth S. Collins (Imperial College London), H. Jay Melosh (Purdue University), and Gordon R. Osinski (University of Western Ontario)
- **Shock metamorphism of minerals**
  Falko Langenhorst (Friedrich-Schiller-Universität Jena) and Alex Deutsch (Westfälische Wilhelms-Universität Münster)
- **Geochemistry of impactites**
  Christian Koeberl (University of Vienna and Natural History Museum, Vienna), Philippe Claeys (Vrije Universiteit Brussel), Lutz Hecht (Natural History Museum, Berlin), and Iain McDonald (Cardiff University)
- **Distal impact ejecta layers: Spherules and more**
  Billy P. Glass (University of Delaware) and Bruce M. Simonson (Oberlin College)
- **Dating terrestrial impact structures**
  Fred Jourdan (Curtin University), Wolf Uwe Reimold (Humboldt University Berlin), and Alex Deutsch (Westfälische Wilhelms-Universität Münster)
- **Local and global environmental effects of impacts on Earth**
  Elisabetta Pierazzo (Planetary Science Institute) and Natalia Artemieva (Russian Academy of Science)

Volume 8, Number 2 (April)

MINERALS, MICROBES, AND REMEDIATION

GUEST EDITORS: **Anhuai Lu** (Peking University) and **Hailiang Dong** (Miami University)

Studies of mineral–microbe interactions lie at the heart of the emerging field of geomicrobiology, because minerals are the fundamental Earth materials with which microbes interact. Microbes are found in a number of the Earth's extreme environments and also in extraterrestrial materials. In spite of the diverse geological environments in which microbes are found and the various approaches taken to study them, a common thread—mineral–microbe interactions—connects all these environments and experimental approaches and places them under the same umbrella: geomicrobiology. Minerals provide microbes with energy and living habitats, and microbes impact mineral weathering and diagenesis. The recognition of mineral–microbe interactions has revived the classical discipline of mineralogy, and microbes discovered in various habitats have provided microbiologists with unique opportunities for study. This issue considers microbially mediated mineral dissolution, precipitation, and transformation, and the synergistic relation between minerals and microbes for energy acquisition. These interactions have important implications for contaminant remediation.



Atomic force microscope image of an *E. cloacae* CYS-2 cell that produced a protective layer to prevent entry of toxic Cr(VI). This layer is not composed of any Cr(III)-containing particles, but is made of organic molecules. Its formation is possibly controlled by Cr-resistant genes, because it is only present at certain concentrations of Cr(VI). PHOTO BY ZHANG LIN

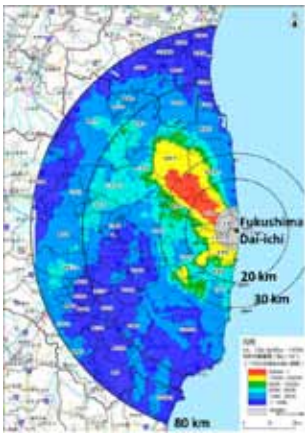
- **Metal oxides, bacteria, and base metals**
  Gordon Southam (University of Western Ontario)
- **Chromium and uranium mineralization as mediated by microbial activity**
  Yangjian Cheng (Chinese Academy of Sciences), Hoiying Holman (Lawrence Berkeley National Laboratory), and Zhang Lin (Chinese Academy of Sciences)
- **Mineral transformations associated with clay–microbe interactions and implications for environmental remediation**
  Hailiang Dong (Miami University)
- **Microbial oxidation of sulfide tailings and its environmental consequences**
  Olli H. Tuovinen (Ohio State University), Xiancai Lu (Nanjing University), and Hongmei Wang (China University of Geosciences)
- **Synergy between semiconducting minerals and microorganisms: Implications for environmental remediation**
  Anhuai Lu (Peking University), Yan Li (Peking University), and Song Jin (University of Wyoming)

Volume 8, Number 3 (June)

FUKUSHIMA DAI-ICHI: ONE YEAR LATER

GUEST EDITORS: **Takashi Murakami** (University of Tokyo) and **Rodney C. Ewing** (University of Michigan)

On March 11, 2011, an earthquake and tsunami hit Japan, killing more than 20,000 persons, displacing tens of thousands, and causing havoc in the infrastructure and economy of the country. In the aftermath of this tragedy, the cooling systems of three of the operating reactors at the Fukushima Dai-ichi nuclear power station failed and meltdown of the reactor cores occurred. Over the following days, a series of hydrogen gas explosions took place. Radionuclides (mainly ^{131}I and ^{137}Cs) were released to the atmosphere and transported over many tens of kilometers from the site, contaminating soil and water. Seawater was used to cool the damaged reactor cores, and water contaminated with radioactivity was released to the ocean. Considerable amounts of used fuel were stored in nearby pools, and with the loss of water, the pools contributed to the release of radioactivity. One year after the tragedy at Fukushima, this issue of *Elements* provides a summary of what is known about the environmental impact of this nuclear accident.



Distribution of ^{134}Cs and ^{137}Cs on the surface on July 2, 2011. COURTESY OF MINISTRY OF EDUCATION, CULTURE, SPORTS, SCIENCE AND TECHNOLOGY OF JAPAN; SLIGHTLY MODIFIED

- **The earthquake**
  Jeroen Ritsema (University of Michigan), Thorne Lay (University of California –Santa Cruz) and Hiroo Kanamori (Caltech)
- **The anatomy of the Fukushima nuclear accident**
  Edward Blandford (Stanford University), Waturu Mizumachi (JNES), and Joonhong Ahn (University of California, Berkeley)
- **Radioactive dispersion in the atmosphere**
  Anne Mathieu (Institute of Radiation Protection and Nuclear Safety) and coauthors
- **Contamination of the geosphere: Effects on soils and water**
  Naohiro Yoshida (Tokyo Institute of Technology) and coauthors
- **Radioactive dispersion in the ocean**
  Yukio Masumoto (Japan Agency of Marine-Earth Science and Technology)
- **Long-term changes and corrosion of spent fuel**
  Bernd Grambow (Université de Nantes) and Christophe Poinssott (CEA)

Volume 8, Number 4 (August)

GRANITIC PEGMATITES: SCIENTIFIC WONDERS AND ECONOMIC BONANZAS

Guest editors: **David London** (University of Oklahoma) and **Daniel J. Kontak** (Laurentian University)

Nothing that geoscientists learn as students prepares them for interpreting rock textures as complex as those found in pegmatites. Understanding the textures and mineral zonation of granitic pegmatites is tantamount to understanding the fundamental process of crystallization. It is a challenge to our ability to discern, beyond reasonable doubt, what is igneous and what is hydrothermal. This is the context that has drawn many professional geoscientists to the study of pegmatites for all or part of their careers. In addition, granitic pegmatites are important to our society as sources of raw materials for glasses and ceramics, silicon for microprocessors, and specialty metals including Li, Cs, Be, Nb, Ta, Sn, REE, and U. A very few pegmatites provide some of the most highly prized mineral specimens and colored gems found in national museums and personal collections around the world. No other rock type presents such a diversity of economic commodities in such concentrated fashion.

The puzzle of pegmatite textures. Photo by David London

- **Granitic pegmatites: Scientific wonders and economic bonanzas**
  David London (University of Oklahoma) and Daniel J. Kontak (Laurentian University)
- **The pegmatite puzzle**
  David London (University of Oklahoma) and George B. Morgan VI (University of Oklahoma)
- **Pegmatite: The industrial minerals storehouse**
  Alex Glover (Active Minerals LLC), Bill Rogers (NYCO Minerals, Inc.), and Jim Barton (Martin Minerals)
- **Granitic pegmatites as sources of strategic metals**
  Robert Linnen (University of Western Ontario), Marieke van Lichterveld (Universität Hannover), and Petr Černý (University of Manitoba)
- **Granitic pegmatites as sources of gem materials**
  William B. "Skip" Simmons (University of New Orleans), Federico Pezzotta (Natural History Museum Milan), Harmut Burlein (Universidade Federal de Pernambuco), and James Shigley (Gemological Institute of America)
- **Granitic pegmatites as complex isotope systems**
  Daniel J. Kontak (Laurentian University), Fang-Zhen Teng (University of Arkansas), and Robert B. Trumbull (GZF Potsdam)
- **Granitic pegmatites as reflections of their sources**
  David London (University of Oklahoma), Milan Novak (Masaryk University, Brno), and Petr Černý (University of Manitoba)

Volume 8, Number 5 (October)

RARE EARTH ELEMENTS: MINERALS, MINES, AND MAGNETS

Guest editors: **Anton R. Chakhmouradian** (University of Manitoba) and **Frances Wall** (University of Exeter)

Rare earth–based materials have practical applications in transportation, renewable energy, medicine, household items, visual arts, forensic science, and defense, and thus are essential to the progress of humankind. The rapid development and implementation of innovative and green technologies in the past decade have resulted in greatly increased demand for rare earth elements (REE). This demand has been amplified by the current situation in the supply market and by growing public concern about unlawful or unethical extraction of certain rare-metal resources. The renewed interest in rare earth resources in the exploration and public sectors requires a much better understanding of these resources and their host rocks than currently available. This thematic issue will present a comprehensive overview of the key geological, geochemical, and mineralogical aspects of REE distribution in the crust and principal deposit types. It will also discuss economic, political, and environmental issues related to REE mining.

- **Introduction to rare earth elements**
  Anton R. Chakhmouradian (University of Manitoba) and Frances Wall (University of Exeter)
- **Rare earths as a complex commodity: World demand and market trends**
  Jack Lifton and Gareth Hatch (Technology Metals Research, LLC)
- **Rare earth mineralization in igneous rocks: Concepts and misconceptions**
  Anton R. Chakhmouradian (University of Manitoba) and Anatoly N. Zaitsev (St. Petersburg University)

The Quest Rare Minerals exploration camp on the shore of Lac Brisson (Strange Lake), some 220 km northeast of Schefferville (northern Quebec). Photo by Anton Chakhmouradian

- **Hydrothermal mobilization of rare earth elements**
  Anthony E. Williams-Jones (McGill University), Iain Samson (University of Windsor), and Artas Migdisov (McGill University)
- **Diversity of rare earth deposits: The key example of China**
  Jindřich Kynický (Mendel University, Brno), Martin Smith (University of Brighton), and Cheng Xu (Peking University)
- **Rare earth exploration and mining in North America**
  Anthony N. Mariano (consultant)

Volume 8, Number 6 (December)

URBAN GEOCHEMISTRY

Guest editors: **W. Berry Lyons** (The Ohio State University) and **Russell S. Harmon** (U.S. Army Corps of Engineers)

By 2030, about 60% of the human population will live in cities. Clearly, anthropogenic activities in urban environments affect geochemical cycles, water resources, and the health of ecosystems and humans globally. Past practices are still having biogeochemical impacts today, and in many cases remediation is needed. Both natural and man-made disasters greatly change the geochemistry of urban areas. Understanding past impacts can aid in future disaster planning. An increased awareness of the geochemical and mineralogical effects of urbanization on geochemical cycling will aid urban planners in the effort to make urban development sustainable.

Hong Kong, China

- **Geochemistry and the sustainable urban environment**
  W. Berry Lyons (The Ohio State University) and Russell Harmon (U.S. Army Corps of Engineers)
- **Urban geochemistry: The legacy problem**
  Stefano Albanese (Università degli Studi di Napoli) and Domenico Cicchella (Università del Sannio)
- **The impact of urban development on hydrology and geochemistry**
  Corinne Wong (University of Texas at Austin) and co-authors
- **Ecological and biogeochemical dynamics in urban settings: Lessons from long-term ecological research**
  Dan Bain (University of Pittsburgh), Wil Wollheim (University of New Hampshire), and Rebecca Hale (Arizona State University)
- **Urban geochemistry and human health**
  Gabriel Filippelli (IUPUI), Deborah Morrison (Indiana School of Medicine), and Domenico Cichella (Università del Sannio)
- **Greenhouse gas emissions from urban settings**
  Francesco Bellucci, Jean Bogner, and Neil Sturchio (University of Illinois at Chicago)
- **Environmental and medical geochemistry in urban disaster response and preparedness**
  Geoffrey S. Plumlee (USGS) and co-authors