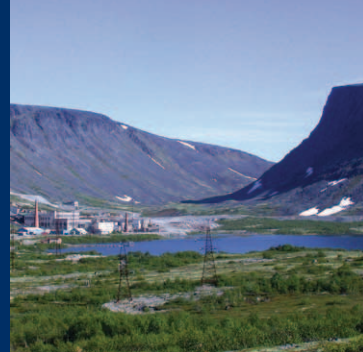


# Elements

An International Magazine of Mineralogy, Geochemistry, and Petrology



Volume 8, Number 5 • October 2012

## Rare Earth Elements

Guest Editors: **Anton R. Chakhmouradian and Frances Wall**



### Rare Earth Elements: Minerals, Mines, Magnets (and More)

Anton R. Chakhmouradian and Frances Wall



### Dynamics in the Global Market for Rare Earths

Gareth P. Hatch



### Rare Earth Mineralization in Igneous Rocks: Sources and Processes

Anton R. Chakhmouradian and Anatoly N. Zaitsev



### Hydrothermal Mobilisation of the Rare Earth Elements: A Tale of "Ceria" and "Yttria"

Anthony E. Williams-Jones, Artashes A. Migdisov, and Iain M. Samson



### Diversity of Rare Earth Deposits: The Key Example of China

Jindrich Kynicky, Martin P. Smith, and Cheng Xu



### Rare Earth Mining and Exploration in North America

Anthony N. Mariano and Anthony Mariano Jr.

ABOUT THE COVER: Peralkaline rocks of the Lovozero plateau (in the background) in the Kola Peninsula host loparite deposits that have been exploited in the Karnasurt mine (pictured here) since 1951 and served as the principal source of rare earths for Soviet industry. Loparite production has declined drastically since the collapse of the USSR due to market pressure and other economic problems. The deposits of weathering-resistant, eudialyte-rich nepheline syenite making up the "roof" of the Lovozero plateau could breathe new life into this region and the entire Russian rare earth industry if technologists figure out a way to profitably recover these elements from eudialyte.

*Elements* is published jointly by the Mineralogical Society of America, the Mineralogical Society of Great Britain and Ireland, the Mineralogical Association of Canada, the Geochemical Society, The Clay Minerals Society, the European Association of Geochemistry, the International Association of GeoChemistry, the Société Française de Minéralogie et de Cristallographie, the Association of Applied Geochemists, the Deutsche Mineralogische Gesellschaft, the Società Italiana di Mineralogia e Petrologia, the International Association of Geoanalysts, the Polskie Towarzystwo Mineralogiczne (Mineralogical Society of Poland), the Sociedad Española de Mineralogía, the Swiss Society of Mineralogy and Petrology, the Meteoritical Society, and the Japan Association of Mineralogical Sciences. It is provided as a benefit to members of these societies.

*Elements* is published six times a year. Individuals are encouraged to join any one of the participating societies to receive *Elements*. Institutional subscribers to any of the following journals—*American Mineralogist*, *Clay Minerals*, *Clays and Clay Minerals*, *Mineralogical Magazine*, and *The Canadian Mineralogist*—also receive one copy of *Elements* as part of their 2012 subscription. Institutional subscriptions are available for US\$160 (US\$175 non-US addresses) a year in 2013. Contact the managing editor (tremblp@ete.inrs.ca) for information.

Copyright 2012 by the Mineralogical Society of America

All rights reserved. Reproduction in any form, including translation to other languages, or by any means—graphic, electronic, or mechanical, including photocopying or information storage and retrieval systems—without written permission from the copyright holder is strictly prohibited.

Publications mail agreement no. 40037944

Printed in USA

ISSN 1811-5209 (print)

ISSN 1811-5217 (online)

[www.elementsmagazine.org](http://www.elementsmagazine.org)

[www.elements.geoscienceworld.org](http://www.elements.geoscienceworld.org)

 **GeoScienceWorld**  
Participating Publisher



## DEPARTMENTS

<b>Editorial</b> – Tales, Tales...	<b>323</b>
<b>From the Editors</b> – <i>Elements</i> Course Packs	<b>324</b>
<b>Triple Point</b> – A Sabbatical Project	<b>325</b>
<b>People in the News</b> – Macfarlane, Brown, Dingwell	<b>326</b>
<b>CosmoElements</b> – The Stardust Comet Mission	<b>327</b>
<b>Meet the Authors</b>	<b>330</b>
<b>Society News</b>	
Japan Association of Mineralogical Sciences	377
Association of Applied Geochemists	378
Deutsche Mineralogische Gesellschaft	379
Meteoritical Society	380
Mineralogical Society of Great Britain and Ireland	382
European Association of Geochemistry	384
The Clay Minerals Society	385
Geochemical Society	386
Mineralogical Society of America	388
International Association of GeoChemistry	390
Spanish Mineralogical Society	391
Mineralogical Association of Canada	392
<b>Book Review</b> – <i>Layered Mineral Structures</i>	<b>394</b>
<b>Parting Shots</b> – Full Stop for Mother Earth	<b>396</b>
<b>Advertisers in This Issue</b>	<b>400</b>