

Rare-earth Information Center NEWS

Ames Laboratory
Institute for Physical Research and Technology
Iowa State University / Ames, Iowa 50011-3020 / U.S.A.

Volume XXVI

June 1, 1991

No. 2

Mt. Weld Carbonatite

R. K. Duncan authored a paper entitled "Tantalum, Niobium, and Rare Earth Resources of the Mt. Weld Carbonatite, Western Australia". The paper was presented by D. J. Kingsnorth at the 31st General Assembly of the Tantalum-Niobium International Study Centre in Perth, Western Australia on November 6, 1990. Mr. Kingsnorth is Marketing Manager of the Mt. Weld project for Carr Boyd Minerals, a subsidiary of Ashton Mining, Limited.

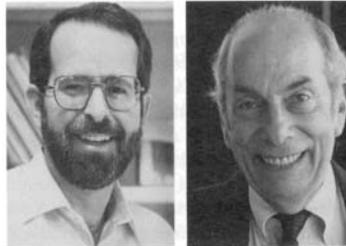
The Mt. Weld carbonatite is a circular volcanic neck or plug, approximately 3km in diameter lying buried beneath alluvium and Tertiary lake sediments 35km south of Laverton in the Eastern Goldfields of Western Australia.

The large high grade rare earth deposits, currently the subject of feasibility studies by Carr Boyd Minerals, are composed largely of thorium-deficient secondary monazite accompanied in part by the yttrium-rich phosphate, churchite. The rare earth deposits have grades of combined lanthanide oxides up to 45% and are probably derived from supergene destruction of residual apatite which in the primary carbonatite contains up to 1% lanthanide oxides. Concentrations of yttrium (up to 3400 ppm Y_2O_3) and lanthanides (up to 6.5% R_2O_3) are also hosted by crandallite in the niobium and tantalum ore deposits, but these may only be significant if they can be produced as by-products of niobium and tantalum extraction. The total rare earth reserves are estimated at 17×10^6 tons (MT) of total lanthanide and yttrium oxides. This number is based on a cut-off grade of 5 percent.

Extensive bench scale and pilot plant beneficiation work based on phosphate flotation has produced monazite concentrates acceptable to conventional cracking and rare earth extraction processes. This has required the development of novel techniques and reagents currently the subject of patent applications. Plans for devel-

Continued on page 6

New Materials Prize



Francis DiSalvo

Frederic Holtzberg

The 1991 American Physical Society International Prize for New Materials, sponsored by International Business Machines Corporation, was shared by two scientists—Dr. Francis J. DiSalvo, Jr. of Cornell University and Dr. Frederic Holtzberg of IBM's Thomas J. Watson Research Center. The citation states that the award was for "the discovery and studies of new materials characterized by strong electron correlations and novel excitations". Although DiSalvo and Holtzberg have concentrated on different classes of materials, both employed methods that are at the frontier between chemistry and physics to synthesize materials with novel properties.

DiSalvo discovered high-energy-density materials for battery cathodes based on lithium insertion and had a role in the discovery of charge density waves. He has also discovered ionic conductors that conduct by anion motion. More recently, he has produced new Chevrel phases of solids that contain transition metal clusters. His group, using a purely chemical technique, has produced the thinnest wires known, only 6 angstroms in diameter.

Holtzberg has focused his research on rare earth compounds and, in the 1960's, with Siegfried Methfessel, did some of the earliest work on europium chalcogenides and their alloys, producing the magnetic phase diagrams of doped binary solid solutions of Eu. He synthesized single crystals

Continued in next column

Molycorp For Sale

Unocal Corporation has announced that it will seek buyers for its Los Angeles-based Molycorp Inc. mining subsidiary, and for its chemicals distribution and emulsion polymers operations in Schaumburg, Illinois. The sales process is planned to begin in late May and Unocal hopes it will be completed by the end of 1991. Morgan Stanley, Incorporated has been chosen to negotiate buyers for the divisions for sale.

Molycorp operates the world's largest bastnasite mine in Mountain Pass, California and has plants in Louviers, Colorado and in York and Washington, Pennsylvania. They have offices in Los Angeles, California, White Plains, New York, Paris, France, and Tokyo, Japan. They have been in the rare earth business since February 1950 when they began to acquire the mining claims for the Mountain Pass ore body. ▲

of various rare earth compounds having the Th_3P_4 structures, found superconductivity in a defect compound of lanthanum (La_3S_4 or La_3Se_4), and discovered the configurational transition in intermediate-valence compounds with doping. He grew some of the first single crystals of the Chevrel phases.

DiSalvo, after earning his Ph.D. at Stanford University, worked at AT&T Bell Laboratories from 1971-86 where he started as a member of the technical staff. After rising to head of the Solid State and Physics of Materials Research Department at Bell Laboratories, he left in 1986 to become professor of chemistry at Cornell University, Ithaca, New York.

Holtzberg earned his Ph.D. at the Polytechnic Institute of Brooklyn in 1952, then joined the IBM Thomas J. Watson Research Center at Columbia University. He took a leave of absence in 1959-60 to become technical assistant to the President of the United States, and consultant to the Office of Science and Technology. He rejoined IBM where he is presently a research staff member. ▲

ISMO'91 Magneto-Optics

The 2nd International Symposium on Magneto-Optics, (ISMO'91) will be held in Kharkov, Ukraine, USSR on September 10-13, 1991. This Symposium is a satellite meeting to the International Conference on Magnetism 1991 (ICM'91) to be held in Edinburgh, Scotland. About 15 invited talks, plus contributed papers, are planned. All facets of magneto-optics, practical as well as scientific, will be included.

All correspondence should be addressed to: ISMO'91, Prof. V. V. Eremenko, Chairman, Institute for Low Temperature Physics and Engineering of the UKR.SSR AS, 47 Lenin Avenue, Kharkov 310164, USSR. Telephone (007-0572)-32-11-59. Fax (007-0572)-40-97-23. ▲

TMS-Australasian IMM Rare Earth Symposium

A call for papers for the Joint TMS - Australasian IMM Rare Earth Symposium; Sources, Science, Technology and Applications has been issued. This symposium is scheduled for March 2-5, 1992, as part of the TMS Annual Meeting in San Diego, California. Abstracts are due July 1, 1991 and camera-ready manuscripts should be submitted by September 1, 1991. A proceedings volume of the symposium will be available by meeting time.

This symposium is sponsored by The Minerals, Metals, and Materials Society (TMS), and the Australasian Institute of Mining and Metallurgy (IMM). This symposium on rare earths will cover geology and mineralogy, economics and markets, mineral beneficiation, extraction, separation technology, refining, product preparation, and alloy preparation. Basic and applied research topics include magnetic, electronic and optical behaviors, alloy and solid state chemistry, superconductivity, physical metallurgy, and ceramic materials. Sessions will also be devoted to applications, such as: industrial plant practice and high technology applications in electronic, magnetic, and optical devices.

For additional information and submission of abstracts, contact Dr. Renato G. Bautista, Department of Chemical and Metallurgical Engineering, University of Nevada, Reno, NV 89551, U.S.A. Telephone (702)784-1602. Fax (702)784-1766. ▲

Conference Calendar

* A NEWS STORY THIS ISSUE

July '91

19th Rare Earth Research Conference (19th RERC)
Lexington, Kentucky, U.S.A.
July 14-19, 1991
RIC News, XXV, [1] 2 (1990) and XXVI, [1] 2 (1991)

September '91

International Symposium on Magneto-Optics 1991 (ISMO'91)
Kharkov, Ukraine, USSR
September 10-13, 1991
* This issue

March '92

Joint TMS-Australasian IMM Rare Earth Symposium: Sources Science, Technology, and Applications
San Diego, California, U.S.A.
March 2-5, 1992
* This issue

June '92

Rare Earths '92 International Conference
Kyoto, Japan
June 1-5, 1992
RIC News, XXV, [3] 2 (1990)

ISPM'92

The Chinese Institute of Electronics and the IEEE Beijing Section is sponsoring the 2nd International Symposium on Physics of Magnetic Materials (ISPM'92) to be held July 3-8, 1992 in Beijing, People's Republic of China. The deadline for the submission of abstracts is October 31, 1991 with manuscripts due February 15, 1992. The scope of the symposium includes: basic magnetism, magnetization processes, artificial materials, applied magnetism, new materials, technology and applications, and general problems. An exhibit will be held during the symposium.

For information and instructions write to Prof. Yang Luo, San Huan R/D Center, Academia Sinica, P.O. Box 603, Beijing, 100080, People's Republic of China. Telex 222592 SHI CN. Fax 2561268.

Dr. Karl Strnat, Professor Emeritus at the University of Dayton, Ohio is involved in the organization of this symposium and has

Continued in next column ⇨

July '92

2nd International Symposium on Physics of Magnetic Materials (ISPM'92)
Beijing, People's Republic of China
July 3-8, 1992
* This issue

12th International Workshop on Rare Earth Magnets and Their Applications and 7th International Symposium on Anisotropy and Coercivity in Rare Earth-Transition Metal Alloys
Canberra, Australia
July 12-16, 1992
* This issue

April '93

Rare Earth Minerals: Chemistry, Origin, and Ore Deposits
London, England
April 1-2, 1993
* This issue

offered his services as a U.S. contact person for further information. He can be reached at KJS Associates, Magnetics Engineering, 1712 Springfield St., Dayton, OH 45403-1432. ▲

12th RE Magnet Workshop

The Twelfth International Workshop on Rare-Earth Magnets and Their Applications will be held July 12-15, 1992 in Canberra, Australia. In conjunction with the workshop, the Seventh International Symposium on Anisotropy and Coercivity in Rare Earth-Transition Metal Alloys will be held on July 16, 1992.

A wide spectrum of topics and problems of scientific, technological, and commercial nature relating to permanent magnets, materials, and devices will be covered. They include, but are not limited to, progress in magnet materials and process development; applications of rare-earth magnets (such as circuit design, concepts, devices and systems engineering, manufacturing problems,

Continued on page 3 ⇨

Meetings/Continued from page 2

economic aspects); raw materials processing and resources; standards and related topics. There will be an exhibit of industrial products, devices, materials, and test equipment.

Dr. Robert Street is Workshop Chairman while Dr. John Cook is Vice-chairman of the Organizing Committee. Karl Strnat and Norton Jackson have kindly agreed to serve as Honorary Co-Chairmen for this meeting.

For more information and to get on the mailing list please contact: Australian Convention and Travel Services (ACTS), GPO Box 2200, Canberra ACT 2601, Australia. Telephone (+616) 257 3299; Fax (+616) 257 3256. Dr. Strnat has agreed to act as contact person for North America. His address is 1616 Hillrose Place, Fairborn, OH 45324-4017, U.S.A. Telephone (513) 254-9707. Fax (513) 254-3575. ▲

Rare Earth Minerals Conference

An international conference on "Rare Earth Minerals: Chemistry, Origin and Ore Deposits" to be held in London at the British Museum (Natural History) on April 1-2, 1993, is in the early planning stage. All aspects of rare earth minerals from their structure and chemistry to their origin, concentration, and alteration in all geological environments will be discussed and will include consideration of existing and potential ore deposits. The conference is sponsored by the Mineralogical Society and British Museum of Natural History. To keep informed and to receive further announcements write: Ms. Frances Wall, Department of Mineralogy, Rare Earth Minerals Conference, The Natural History Museum, Cromwell Road, London SW7 5BD, United Kingdom. ▲

ICFE Proceedings

The proceedings of the 1st International Conference on f-Elements (1st ICFE) has been published in a special supplemental volume (28) of *Eur. J. Solid State Inorg. Chem.*, entitled, "New Developments in f-Elements". It is 678 pages long, and contains 125 papers presented at the conference held September 4-7, 1990 in Leuven, Belgium.

The ICFE was formed to bring under one sponsor the international conferences once known as the International Rare Earth Conference (IREC) and the International Conference on Lanthanides and Actinides (ICLA), both being held in Europe. This is part of a worldwide effort to hold only one

Continued in next column ⇨

Kôki Ikeda

The RIC has learned that Professor Kôki Ikeda died on April 5, 1991, after a brief illness due to a bacterial infection following an operation for an ulcer in early March. We were deeply saddened by his sudden and premature death. He will be truly missed by all of us, especially those who have had the privilege and pleasure to work with him and to know him as a friend and companion.

Prof. Ikeda was born in Sakata, Japan on February 23, 1946. He obtained his bachelor and doctor degrees from Tohoku University, Sendai in 1968 and 1973, respectively. He spent seven years as a doctoral and post-doctoral fellow carrying out research at the Research Institute for Iron, Steel and other Metals (now called Institute for Materials Research), Tohoku University, before joining the Faculty of Engineering, Iwate University, Morioka, Japan in 1975. Except for a two year visit (1978-80) at the Ames Laboratory, Iowa State University, Ames, Iowa, U.S.A. and a one year stay (1982-3) at the Laboratoire de Physique des Solides, Université de Paris-Sud, Orsay, France, he has, since 1975, been a faculty member in the Department of Metallurgy, Iwate University. He became a full Professor in 1989.

Prof. Ikeda studied the electrical and magnetic properties of materials containing the transition and rare earth elements by using electrical resistivity, low temperature heat capacity, and magnetization measurements. His studies include: (1) the effect of magnetic field on the spin fluctuations, (2) the correlation between the electrical resistivity and magnetism, (3) the influence of the lattice faults on the magnetic properties, (4) the origin of the high upper-critical field in the ceramic superconductors, and (5) the correlations between superconductivity and lattice instability in lanthanum chalcogenides. He published 71 papers on these and related topics. In 1990 Prof. Ikeda received the 48th Meritorious Honor Award of the Japan Institute of Metals for his work in the field of materials physics. ▲

big, broad-scope international conference per year dedicated to the rare earths and actinides. These conferences are of interest to scientists of any discipline, as well as, engineers and technical personnel from industry.

The following sections are included in the proceedings: 1- Theory and Spectroscopy; 2- Coordination Chemistry; 3- Analytical and Environmental Chemistry and

Continued on page 4 ⇨



USR Optonix, Inc.

In our third year of honoring 20 year sponsors we have one company eligible to join our 20-year club. USR Optonix, Inc. joins ten other companies that have been with us for 20 or more years. We extend a special thanks for their wonderful and continued financial and moral support.

** THANKS FOR 10 YEARS **

Nissho Iwai America Corporation
Yue Long Chemical Plant

Two more companies, Nissho Iwai America Corporation and Yue Long Chemical Plant have become eligible to have their names listed on our honor roll for 10 years of support. They join 35 others who have had their names on the honor roll in the RIC News. We wish to express a special thanks to the 37 companies who have had their names listed in this special place of honor. ▲

1990 Rolex Award

Dr. Marcel Poulain, a professor in the Department of Solid State Chemistry at Rennes University received an honorable mention at the Rolex Awards for Enterprise — 1990. The Rolex Awards are given to support unconventional projects in: applied science and inventions, exploration and discovery, or the environment. This award was given for Poulain's part in development of fluoride glass optical fibers.

Poulain had worked for several years on fluoride complexes of zirconium when, in 1974, one of his experiments produced pieces of glass instead of crystals. This glass had good chemical resistance to fluorinating reagents and was transparent to ultraviolet and infrared spectra up to 8 mm. It was promising as a laser host for rare earths, had high fluorine ion conductivity, and had lower optical loss than oxide glasses.

Poulain founded the company Le Verre Fluore to develop and manufacture the new fluoride glasses. The company has developed a range of special technologies and has manufactured fluoride glass fibers for customers in many countries. ▲

Gmelin Handbook

Gmelin Handbook of Inorganic and Organometallic Chemistry, 8th edition, Volume C11b, covers the rare earth systems with boron from Ce to Lu, the rare earth borates, alkali borates and hydroborates as well as some smaller sections dealing with alkali lanthanum hexaborides, scandium and europium halogen borates, rare earth boride nitrides and scandium boride halogenides. The sections on Sc, Y, and La with boron were included in Volume C11a, published last year and reviewed on page 4 of the December 1990 *RIC News*.

The most extensively studied borides, CeB_6 , SmB_6 and EuB_6 are treated in this volume. CeB_6 is a typical dense Kondo system with interesting magnetic properties at low temperatures. Much experimental work has been done to elucidate the magnetic phase diagram, the structure of the magnetic phases, and the electronic structure, but many questions are still unresolved. CeB_6 is often used as a model compound in theoretical investigations dealing with heavy fermion systems. Heavy fermion systems are different from valence fluctuation systems due to different electron correlations, CeB_6 is a heavy fermion system whereas SmB_6 is a typical valence fluctuation system. The solid solutions $(Sm,R)B_6$ with $R = Eu$ to Lu are treated together with those of $R = Y$ to Nd because most experimental data are pertinent to the Sm valency. Conflicting data are reported on EuB_6 , especially on magnetic and electronic properties, but many of the inconsistent data may be caused by impurities or deviations from stoichiometry.

Three types of rare earth borates are reported on in the $R_2O_3-B_2O_3$ systems: R_3BO_3 , RBO_3 , and RB_3O_6 . The M_2O_3 -rich melts have an extended range of immiscibility and can be obtained as glasses. The sections on the borates and the alkali rare earth borates deal mainly with the preparation, crystallographic properties, and optical properties. The orthoborates RBO_3 and the metaborates RB_3O_6 doped with other rare earth ions are common phosphors. Data on the rare earth hydroborates are summarized in the last section of the present volume because nonsolvated hydroborates exist only for $R(BH_4)_3$ with $R = La, Ce, \text{ or } Nd$.

Volume C11b, published in 1991, lists 5 authors, including the chief editor, Hartmut Bergmann. It is 496 pages in length with 253 figures. Orders and/or inquiries should be sent to Springer-Verlag, Heidelberg Platz 3, D-1000, Berlin 33. Cost of this volume is DM 2,871.00 (~\$1670.00 U.S.). ▲

The following is an excerpt from a letter received by the Editor of *RIC News* from Joseph R. Peterson, Professor of Chemistry at the University of Tennessee, Knoxville, Tennessee.

Dear Gentlemen:

The latest issue of *RIC News* is very readable and, as usual, contains useful information for *f*-element scientists. I have recently joined the European Rare Earth and Actinide Society in order to receive their regular newsletters. Do you think that it is possible for RIC and ERES to agree on some regular exchange of newsletters, so that one doesn't have to be members of both groups to get the appropriate information? What about having both publications online on some sort of bulletin board, so that any interested person (with computer/modem access) could access it? Hard copies are nice, but they are expensive to produce and mail! Any person with the proper hardware and software could download and print a copy of a newsletter that was posted on an electronic bulletin board. Let me know your feelings on this subject.

Editor's response:

We have not given much thought to putting the *RIC News* on bitnet or some other electronic medium. Perhaps some day in the future this might be another route to go. With regard to your comment about it being expensive to mail the *RIC News*, I should like to inform you that it costs us less than 10 cents a copy to mail it to you. Overseas, it is more expensive, but we have made provisions to mail it at a minimum expense to RIC, with foreign commercial producers picking up a good share of the costs by remailing it in their countries overseas. Our biggest costs in producing the *RIC News* are the salaries of the person who writes the news stories and the secretaries who are involved in entering the text (as necessary) on computer and keeping our mailing list up to date. We have over 10,500 subscribers to the *RIC News* worldwide.

Note to readers:

If you do desire having *RIC News* on an electronic medium, please let us know. If there is sufficient favorable response, we will do our best to establish this service.

Editor

★★★

Continued in next column ⇨

Letters to the Editor

The following is from a letter from LeRoy Eyring, Professor of Chemistry at Arizona State University, Tempe, Arizona.

Dear Karl,

The literature search you sent on the praseodymium oxides arrived promptly and is a tremendous help. I have been trying with the help of professionals, to get a similar search from the Chemical Abstracts data base without anything like the success you demonstrate.

Editor's Comments:

We welcome your comments, and over the years, from the feed-back we have received from the users of the RIC literature retrieval system, we are able to provide more specific information related to the requester's needs than most of the large, commonly known information retrieval systems. The next time any of you other readers need information on rare earths try us — this is one of our main functions. We have over 54,000 references, which can be accessed by over 33,000 key words or 43,000 author's names. If you work for a company which supports us the service is free. For others the cost is usually quite nominal, and can be free if the requester has no source of financial support. For more information, or a search, contact us - see the mail block on page five of this issue.

★★★

The following is from a letter from Dave Mustoe, Custom Technical Ceramics, Unit 6, 8041 w. I-70 Service Road, Arvada, CO 80002.

Dear Dr. Gschneider:

I have been enjoying the *RIC News* for quite a while. On reading the March 1991 issue I wondered if it would be of value to your readership that we make and stock ceramic containers (crucibles, boats, and trays) made from yttrium oxide, cerium oxide and other lesser used oxide and fluoride ceramics. ▲

ICFE Proceedings/Continued from page 3 ⇨

Geochemistry; 4- Reactivity, Catalysis, and Organometallic Chemistry; 5- Solid State Chemistry and Physics; and 6- High temperature Superconducting Magnets. The special volume costs 3,600 Belgian francs (BF) (~\$100 U.S.). Send your order to ICFE, Prof. C. Görrler-Walrand, Department of Chemistry, Celestijnenlaan 200F, B-3001 Heverlee-Leuven, Belgium. ▲

New Metal Forming Process

A patent describing a new process for forming metal or metal compound coatings has been granted to the University of Colorado. This process, invented by chemistry professor Robert E. Sievers and graduate student Brian Hansen, is called Supercritical Fluid Transport - Chemical Deposition (SFT-CD). In the SFT-DC process, a coating compound is mixed with a supercritical fluid and the mixture is sprayed onto a heated surface where a chemical reaction produces a stable coating. The temperature of the surface to be coated is 500 to 1500°F, depending upon the coating material. A reaction takes place resulting in the formation of the desired coating on the surface. The example which the inventors used in their patent application involved coatings of yttrium and/or combinations of Y, Ba, and Cu on silicon substrates. The coatings may be metallic in nature or consist of oxides or other compounds.

The University of Colorado has granted Sievers Research an exclusive license with the right to grant sub-licenses. Information may be obtained by contacting Robert E. Sievers, Department of Chemistry and Biochemistry, University of Colorado, Campus Box 215, Boulder, CO 80309-0215, U.S.A. Telephone (303) 492-7943, or Dr. Misha Plam, Sievers Research, Inc., 1930 Central Avenue, Suite C, Boulder, CO 80301. Telephone (303) 444-2009. ▲

Magnetic Properties of RAI_2 Compounds

A critical review of the magnetic properties of the isostructural RAI_2 intermetallic compounds, where R = Ce, Pr, Nd, Sm, Tb, Dy, Ho, Er, and Tm has been published by H.-G. Purwins and A. Leson in *Advances in Physics*, 39, 309-405 (1990). For scientists, the rare earths are of fundamental interest because most of them behave as well defined ions in solids and thus are ideal materials in many respects for investigation of a number of physical properties. Several theoretical models have been developed to describe such behavior. One of these is the widely used crystal-field (CF) model. This is based on very simple and elegant concepts but has the disadvantage that, at the present time, its parameters can not be derived from first principles but must be determined for each material studied. One purpose of this review was to conduct a systematic investigation of a series of isostructural materials in order to determine the extent to which the CF model is applicable and to gain increased insight into the theory itself.

The review is quite detailed with some 94 pages and 205 references. The work is divided into the six sections described below.

1. Survey: The authors briefly survey the developments of the rare earths and our physical and chemical understanding of them. The strengths and weaknesses of several theories are given and the reasons for picking the RAI_2 materials for the study are presented.

2. Theoretical description: The theoretical treatment involved with understanding the CF theory as a perturbation on the free ion state is described. The theory is adapted for the RAI_2 series and the magnetic exchange interaction and secondary magnetic effects on the theory are developed.

3. Calculation of magnetic properties: The details of calculation are developed to include the overall splitting of the free ion states by the CF field. Among the properties treated are: magnetic anisotropy, excitation, form factor, resonance effects, magnetostriction, contribution to the molar heat capacity, and transport properties.

4. Experimental results: This is the major portion of the review and contains 55 pages of detailed evaluation of the pertinent magnetic data for nine of the RAI_2 intermetallic compounds. A comparison of experimental results to CF theory predictions on an individual compound basis is made.

Continued in next column ◊

RE Magnetic Workshop and Symposium

The Proceedings of the Eleventh International Workshop on Rare Earth Magnets and their Applications and the Sixth International Symposium on Magnetic Anisotropy and Coercivity in Rare Earth - Transition Metal Alloys has been published by the Carnegie Mellon Research Institute. The workshop and symposium were held in Pittsburgh, Pennsylvania in October, 1990. The proceedings, in two volumes, are edited by S. G. Sankar. Volume I, 614 pages in length, covers the papers presented at the workshop, and volume II, 544 pages, covers the symposium. Copies may be obtained from Carnegie Mellon Research Institute (Attn: S. G. Sankar), Carnegie Mellon University, Pittsburgh, Pennsylvania 15213, U.S.A. Each volume costs \$45.00 U.S. plus \$12.00 for airmail to overseas countries if airmail shipment is desired. Purchasers should specify whether they desire the proceedings of the workshop (Volume I), or of the symposium (Volume II), or both.

Volume I, Workshop Proceedings, contains 57 papers presented at the eleven sessions and covers such general topics as magnetic processing, corrosion and stability, instrumentation and standards, electrochemical devices, accelerator technology, raw materials and resources, processing and microstructure, rare earth-cobalt magnets, Nd-Fe-B magnets, and design of motors.

Volume II, Symposium Proceedings, contains 43 papers on the general topics of magnetic viscosity, anisotropy, coercivity, new materials, such as nitrides and carbides and intrinsic properties. ▲

5. Comparison of isostructural compounds: The authors expand the comparison of CF theory and exchange parameters to the measured values of the isostructural series as a whole, using a reduced set of parameters that should be R^{3+} ion independent.

6. Conclusions: For single RAI_2 compounds, CF and molecular-field theory provides a good description of a number of magnetic properties. However, for more complex systems (non-cubic, greater than 2 CF parameters) the description will no longer be unique. In addition the occasional deviations of theory from experiment makes it clear that a more elaborate theory is needed. The authors feel this cannot be an extension of the present model but requires new concepts, going back to the fundamentals of chemical bonding. ▲

RIC News

(USPS 464-960)

Vol. XXVI, No. 2 June 1, 1991

Published quarterly in March, June, September, and December by
Rare-earth Information Center,
Ames Laboratory,
Institute for Physical
Research and Technology,
Iowa State University,
Ames, Iowa 50011-3020

Second-class postage
paid at Ames, Iowa

Postmaster: Send address changes to:
RIC News, Rare-earth Information Center
Ames Laboratory,
Institute for Physical
Research and Technology,
Iowa State University,
Ames, IA 50011-3020
Telephone: (515)294-2272
Telex: 269266
Facsimile: (515)294-3226
BITNET: RIC@ALISUVAX

K. A. Gschneidner, Jr. Editor
Wayne Calderwood Staff Writer
Joel Calhoun Staff Writer
Jennings Capellen Staff Writer
John Mason Staff Writer

RIC Survives Desert Storm

RIC received the welcome news in late April that Joel Calhoun had made it back home to Iowa. As Joel would say — “fantastic”. As you read this, he is busy conducting “business” as normal. RIC appreciates everyone’s patience and understanding during Joel’s absence and wishes to thank Jennings “Cap” Capellen, John Mason, and Wayne Calderwood for their efforts while Joel was gone. ▲

Tricoastal Lanthanides

According to Ms. Betty Zhang, Tricoastal Lanthanides Company of Norwalk, Connecticut “accepted the responsibility to be the exclusive agent for Baotou Steel and Rare Earth Company in Inner Mongolia, China in the fourth quarter of 1990”.

Baotou Steel and Rare Earth has a current product line of rare earth compounds and metals. Ms. Zhang states that Tricoastal has more than 23 years experience in sales, marketing, product development, and distribution of lanthanide products. ▲

Indian Rare Earths

We announced in the September 1990 issue of the *RIC News* that Mr. K. Subramian had replaced Mr. R. K. Garg as Chairman and Managing Director of Indian Rare Earths, Limited of India. We have learned since that this was an interim appointment. Mr. M. S. Nagar has been selected as Chairman and Managing Director and Mr. Subramian has returned to his previous job as Technical Director. ▲

Errata

We erred in leaving the “s” off the Earth in the headline of the story concerning the retirement of Mr. R. K. Garg of Indian Rare Earths Limited, on page 6 of the September 1990 issue of the *RIC News*. We apologize for our oversight. ▲

Mt. Weld Carbonatite/Continued from page 1

opment of the rare earth resources envisage a beneficiation plant at Mt. Weld producing approximately 10,000 tpa concentrates which will be further processed at a plant in the Perth region.

Full feasibility studies are underway and a start to mining as early as 1994 is envisaged. Marketing studies have supported the feasibility of supplying approximately 10% of the world lanthanide market with a number of specific high grade products. ▲

Supporters

Since the last issue of the *RIC News* went to press, RIC has received support from 6 new family members, and renewed support from 30 other organizations.

The supporters for the fourth quarter who wish to be listed, grouped according to their appropriate category, and with the number of years that they have contributed to the Center in parentheses, are listed below.

Benefactor (\$10,000 or more)

Donor (\$4000 to \$9999)

Patron (\$1000 to \$1999)

GTE Laboratories Incorporated,
U.S.A. (19)

Sustaining (\$400 to \$999)

Aldrich Chemical Company,
Incorporated, U.S.A. (12)

Eastman Kodak Company, U.S.A. (14)

General Electric Company, Advanced
Technology Department, U.S.A. (4)

General Electric Company, Materials
Engineering Operation, U.S.A. (16)

Kollmorgen Corporation, Industrial
Drives and Inland Motor Divisions,
U.S.A. (15)

Magnequench, Delco Remy, a Division
of General Motors, U.S.A. (6)

Mitsubishi Materials Corporation,
Japan (7)

Nissho Iwai American Corporation,
U.S.A. (10)

NUCLEMON-Nuclebrás de Monazita
e Associados, Limited, Brazil (17)

Outokumpu Magnets Oy, Finland (1)

Philips Research Laboratories, The
Netherlands (7)

Sassoon Metals & Chemicals

Incorporated, U.S.A. (6)

Sumitomo Special Metals Company,
Limited, Japan and U.S.A. (6)

Tricoastal Lanthanides Company,
U.S.A. (1)

Subscriber (less than \$400)

All-Chemie Limited, U.S.A. (1)

APL Engineering Company, U.S.A. (5)

The Applegate Group Incorporated,
U.S.A. (5)

Atomergic Chemetals Corporation,
U.S.A. (19)

Auer-Remy GmbH, Germany (4)

Daesung Industrial Company, Limited,
South Korea (4)

Department of Fisheries and Oceans,
Canada (1)

Ergenics Incorporated, U.S.A. (7)

F. G. Jones Associates, Limited,
U.S.A. (7)

Merck Limited (formerly BDH
Limited), England (4)

MINTEK, Council for Mineral
Technology, Republic of
South Africa (4)

Monsanto Company, U.S.A. (2)

Nonferrous Metals (U.S.A.)

Incorporated, U.S.A. (2)

NUEXCO, U.S.A. (1)

Office of Atomic Energy for Peace,
Thailand (2)

Raytheon Company, U.S.A. (5)

Regional Research Laboratory,
Trivandrum (Council of Scientific &
Industrial Research), India (3)

Salt Lake City Research Center, U.S.
Bureau of Mines, U.S.A. (2)

Shiva Technologies, Incorporated,
U.S.A. (1)

Silicon Metaltech, U.S.A. (3)

Sumitomo Metal Industries, Limited,
Japan (3)

Rare-earth Information Center

Ames Laboratory

Institute for Physical Research and Technology

Iowa State University

Ames, Iowa 50011-3020