



# RARE-EARTH INFORMATION CENTER NEWS

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## RE HANDBOOK #6

Volume 6 of *Handbook on the Physics and Chemistry of Rare Earths*, edited by K. A. Gschneidner, Jr. and L. Eyring, is now available from North-Holland Publishing Co. Although volumes 3, 4, and 5 contain some information on ternary and higher order materials, much of the knowledge on these systems, including organic compounds, is still undiscovered. Volume 6 is the beginning of an extensive exploration and review of these rare earth systems that will extend into future volumes.

The four chapters in this volume deal with ternary and higher order systems containing at least one rare earth element and at least one non-metallic element. The titles and authors of the four chapters are listed below:

- "Hydrogen adsorption in inter-metallic compounds," K. H. J. Buschow;
- "Crystal structures and crystal chemistry of ternary rare-earth transition metal borides, silicides and homologs," E. Parthé and B. Chabot;
- "Phase equilibria in ternary and higher order systems with rare earth elements and boron," P. Rogl; and
- "Preparation of divalent ytterbium and samarium derivatives and their use in organic chemistry," H. B. Kagan and J. L. Nanny.

Volume 6 was published in 1984 and contains 574 + x pages. The price in the U.S.A. and Canada is U.S.\$138.25. The price elsewhere is Dfl.325.00. Lower rates are available on a subscription basis. Volume 6 and the other five volumes are available from Elsevier Science Publishers, P.O. Box 211, 1000 AE Amsterdam, The Netherlands or from Elsevier Science Publishing Co., Inc., P.O. Box 1663, Grand Central Station, New York, N.Y. 10163, U.S.A.

## LIGHT READING

A potentially low cost magneto-optical recorder was described in a paper presented at a topical meeting on Optical Data Storage. The meeting was held January 17-20, 1983 at Incline Village, Nevada, U.S.A. The proceedings were published in 1983 as *SPIE-Proceedings*, Volume 382, by the International Society for Optical Engineering. The paper, authored by I. Sander and M. Urner-Wille of Philips Forschungslaboratorium Hamburg, appeared on pages 240-4. The recorder was assembled and tested with a computer system in the laboratory. Potential application of the recorder is with small personal or office computers. The recorder has the potential capacity of 10 MBytes on a 5 cm disk.

The storage layer consists of a thin amorphous layer 800Å thick. Among the materials tested were Gd-Fe-Bi, Gd-Fe-Sn, Gd-Tb-Fe and Gd-Tb-Fe with small amounts of Bi or Sn. A typical composition might be  $(\text{Gd}_{0.95}\text{Tb}_{0.05})_{0.24}\text{Fe}_{0.76}$ . The storage layer is deposited on a pregrooved photopolymer layer on top of a glass substrate. The storage layer is topped with a glass layer and the entire disk can be encapsulated in plastic or glass to protect the disk in handling.

The information is written and read out by a low power AlGaAs semiconductor laser. The data is recorded thermomagnetically by applying light pulses and magnetic field pulses to the disk simultaneously. The heat from the light pulses allows the magnetic field to reverse the magnetic domains. For readout less light is focused on the disk. The rotation of the plane of polarization of the transmitted light depends on the direction of magnetization of the magnetic domains. The rotation of the polarized light is converted into an intensity modulation and detected by a photodiode array.

## RARE EARTHERS NEW MANAGER INDIAN RARE EARTHS

K. Subramanian has become managing director of Indian Rare Earths Limited, replacing Mr. M. A. Hadi who has retired. The change in chief executive took place June 1, 1984. The Rare-Earth Information Center extends Mr. Subramanian our congratulations and best wishes for success. We also extend our thanks to Mr. Hadi for his support of the RIC and wish him the best in his retirement years.



## Rhone-Poulenc Appointment

Paul O'Hea has been appointed director of marketing for the Special Products Division of Rhone-Poulenc Inc. of Monmouth Junction, New Jersey. He will be responsible for marketing and sales of the company's rare earth and alumina products. He was formerly manager of the company's rare earth plant in Freeport, Texas. The RIC wishes Paul the best in his new job.

## ROMANIAN MAGNETISM

The proceedings of the *International Conference on Magnetism of Rare-Earths and Actinides* held in Bucharest, Romania, September 1-4, 1983 have been received by the RIC. The first 270-page volume was distributed at the conference and contained the 63 invited and contributed papers submitted before the deadline. The second 139-page volume contains 7 postdeadline papers, the

(Continued on page 3)

## MEETINGS IREC 85

The dates for the International Rare Earth Conference: Materials and Chemistry (IREC 85) have been changed from March 18-22, 1985 to March 4-8, 1985.

The organizing committee has also set the following deadlines. Abstracts should be submitted by October 15, 1984. If received by December 10, 1984 the registration fee will be SFr380 (~U.S.\$160) but will be SFr420 (~U.S.\$180) if paid after that date. The registration fee includes the conference proceedings, published as a special issue of *Journal of Less-Common Metals*. Manuscripts should be submitted by December 10, 1984 and hotel reservations received by January 15, 1985. For more information contact Dr. F. Hulliger, Secretary IREC 85, Lab. für Festkörperphysik ETH, CH-8093 Zürich, Switzerland. Copies of the first and second circular may be obtained from Dr. Hulliger or from the RIC.

## 8th REPM WORKSHOP

A technical conference (workshop) on Rare-Earth Permanent Magnets (REPM) will be held on May 6-8, 1985 with a one day symposium on related scientific questions on May 9, 1985. The meetings will be held in Dayton, Ohio, U.S.A. Registration will take place May 5 followed by a social gathering. Formerly known as a Workshop on Rare-Earth-Cobalt Permanent Magnets and Their Applications, the word "cobalt" has been dropped to encompass a wider spectrum of magnetic materials.

The REPM workshop will deal with a wide spectrum of topics and problems of a technological and business nature relating to magnetic materials that contain rare earths and the uses of such magnets. Special sessions are planned on the following subjects: Nd-Fe-B and related magnets; raw materials availability and cost; the place of different types of REPM's in the world of modern magnets; multipole magnets for ion-beam devices; electro-mechanical actuators for robotics and flight control; magneto-mechanical devices/bearings; and the role of magnets in automobiles and public transport.

The 4th International Symposium  
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on Magnetic Anisotropy and Coercivity in Rare-Earth Transition Metal Alloys to be held on May 9, 1985 will have a basic-science orientation. Among the topics involved will be: the physics of magnetic anisotropy; coercivity of magnetic materials; the mechanisms controlling magnetization reversal; and the stability of magnets.

All papers must be written and presented in English. Deadline for abstracts are November 9, 1984 and for full manuscripts February 25, 1985. The proceedings will be ready for distribution to registrants at the workshop and will be available for sale later. The papers presented at the Symposium on Coercivity and Anisotropy will be available as a separate volume.

The registration fee for the workshop will be about U.S.\$400 exclusive of board and room. The fee for the symposium will be U.S.\$40.00. For more information on the workshop and symposium contact Dr. Karl J. Strnat, WS Co-chairman, University of Dayton, KL-365, Dayton, Ohio 45461, U.S.A.

There will be an exhibit of industrial products and developmental items—devices, machines, materials and test equipment. For information on the exhibit contact Thomas D. Dolan, Exhibits Coordinator, Executive Secretary of MMPA, Magnetic Materials Producers Association, 800 Custer Avenue, Evanston, Illinois 60202, U.S.A.

## EPS M.M.A. 85

A European Physical Society Conference on "Magnetic Materials for Applications" (M.M.A. 85) will be held June 3-5, 1985 in Grenoble, France. The deadline for abstracts is February 15, 1985.

The topics to be covered at the conference include the following: permanent magnet materials, soft magnetic materials, magnetic recording, bubble memories, magnetic printing, ferrofluids, and magneto-optic materials. For more information contact G. Meneroud, Laboratoire Louis Néel, C.N.R.S., 166X, 38042 Grenoble-Cedex, France.

## Superconductivity

The International Conference on the Materials and Mechanisms of Superconductivity will be held on the  
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campus of Iowa State University in Ames, Iowa, U.S.A. on May 29-31, 1985. This conference is the fifth in a series formerly entitled Superconductivity in *d*- and *f*-Band Metals. A conference proceedings consisting of invited and contributed papers will be published. The next announcement will include general information regarding the submission of abstracts, housing, and fees. For additional information, contact the conference chairman, Dr. D. K. Finemore, 109 Office and Lab., Iowa State University, Ames, Iowa 50011, U.S.A.

## CONFERENCE CALENDAR

Intl. Symp. on Actinide/Lanthanide Separations  
Honolulu, Hawaii, U.S.A.  
December 16-22, 1984  
*RIC News XVIII* [2] 2 (1983)

\*Intl. Rare Earth Conf.: Materials and Chemistry (IREC 85)  
Zürich, Switzerland  
March 4-8, 1985  
This issue and *RIC News XVIII* [3] 3 (1983)

5th Intl. Conf. on Crystalline Field and Anomalous Mixing Effects in *f*-Electron Systems  
Sendai, Japan  
April 16-19, 1985  
*RIC News XIX* [2] 2 (1984)

1985 InterMag Conference  
St. Paul, Minnesota, U.S.A.  
April 28-May 2, 1985  
*RIC News XIX* [1] 3 (1984)

\*8th Intl. Workshop on Rare-Earth Magnets and Their Applications and 4th Intl. Symp. on Magnetic Anisotropy and Coercivity in Rare Earth-Transition Metal Alloys  
Dayton, Ohio, U.S.A.  
May 6-9, 1985  
This issue and *RIC News XIX* [1] 3 (1984)

\*Materials and Mechanisms of Superconductivity  
Ames, Iowa, U.S.A.  
May 29-31, 1985  
This issue

\*Magnetic Materials for Applications (M.M.A. 85)  
Grenoble, France  
June 3-5, 1985  
This Issue

Int. Conf. on Rare Earth Developments and Applications and Intl. Fair for Rare Earths and Their Application Products  
Beijing, People's Republic of China  
September 10-14, 1985  
*RIC News XIX* [2] 2 (1984)

17th Rare Earth Research Conference  
Hamilton, Ontario, Canada  
June 8-12, 1986  
*RIC News, XIX* [2] 3 (1984)

\*New Listing

## Believe It or Not

As part of their study on plutonium phosphates, C. E. Bamberger, et al., [*Inorg. Chim. Acta*, **94**, 49-56 (1984)] made a critical review of the literature on quaternary phosphates containing alkali metals (M) and lanthanides (Ln) or actinides (An). Their review revealed significant inconsistencies, with possible errors, in the identification of the reported compounds. The compounds reviewed were reported to have the structures of  $M_3(Ln,An)(PO_4)_3$ ,  $M_3(Ln,An)_2(PO_4)_3$ , and  $MAN_2(PO_4)_3$ .

In order to resolve these inconsistencies the authors attempted to synthesize these compounds. In many cases they followed the same procedures as the original authors. Using Raman spectroscopy, because it is especially suited for identifying crystalline phosphorus-containing compounds, they studied the products of their several preparations. They concluded that many, if not all, of the compounds reported to have the  $M_3Ln_2(PO_4)_3$  stoichiometry were really  $LnPO_4$  with minor amounts of  $M_3Ln(PO_4)_2$ . The  $MAN_2(PO_4)_3$  reported in the literature was found to be  $M_3An(PO_4)_2$ .

The discrepancies found in the literature were thought to result from the use of a single identification technique, such as x-ray diffraction, without taking into account its limitations. The lack of chemical analysis and/or a complementary technique to examine the solids may have compounded the identification problems.

## LETTER TO THE EDITOR

Dear Editor:

In reading your short article on Mendeleev and the Periodic Table in the last issue of the *News*, I thought that your readers might be interested in some other facts about rare earths and the table.

Mendeleev only listed four rare earth elements in his first table and they all had incorrect atomic weight values: erbium-56, ytterbium-60, cerium-92, and lanthanum-94. In addition, he included didymium-95, which turned out to be a mixture of rare earth elements. Fortunately for Mendeleev, the properties of the rare earths were also unknown.

Your article implies that Mendeleev developed his table for 20 years and then presented his lecture. In fact, Mendeleev kept developing his table until his death in 1907. Other than the English translations of the last three editions of his book, the Faraday lecture is merely one of the few English versions of his thoughts on the Periodic Table.

With regard to the Periodic Table, Rare Earthers might consider the following point: Are lanthanum and actinium the real analogues of scandium and yttrium or should these analogues be lutetium and lawrencium? I would be interested in any comments.

Norman E. Holden  
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Brookhaven National Laboratory  
Upton, New York 11973, U.S.A.

### Editor's Comment:

The suggestion that lutetium, instead of lanthanum, falls under scandium and yttrium was proposed approximately 20 years ago by D. C. Hamilton [*Amer. J. Phys.* **33**, 637 (1965)]. See *RIC News*, I [2], 1 (1966).

### Magnetism

(Continued from page 1)

conference concluding remarks, and 2 review papers. The review papers cover recent results and developments on magnetic properties of rare earths and actinides at the Romanian National Center of Physics. For more information on the availability of the proceedings contact Professor E. Burzo, Central Institute of Physics, P.O. Box 5222, Bucharest, Romania.

## ANDRÉ BLANDIN

A belated notice of the death of André Blandin on June 11, 1983. Only 50 years old, his work had acquired world-wide renown. André was recognized as an expert on magnetism of metals and alloys containing transition metals or rare earths. Among his students were P. Lederer, B. Coqblin, G. Toulouse, and B. Caroli. They will undoubtedly carry on his tradition. For his scientific work André received from the Societe de Physique the Ancel prize, the Robin prize, and the Holweck prize.

## GMELIN HANDBOOK

The RIC has acquired two more volumes of *Gmelin Handbooks of Inorganic Chemistry* from system number 39 (the rare earths). This brings the total number of volumes published on this system to 25. Volume D6 will be reviewed in this issue and volume C7 in the next.

Volume D6 is the latest volume of the series on coordination compounds of the rare earths. The volume is divided into two parts. The first part (135 pages) treats the ion exchange and solvent extraction reactions of the rare earths not previously dealt with in other *Gmelin* volumes. The main topics are the various heterogeneous reactions themselves, with emphasis on the equilibria and rates of reactions when the rare earth ions are transferred from an aqueous, mixed aqueous-organic, or molten salt phase to the ion exchanger or organic solvent phase. These reactions are often employed for separation of rare earth elements, either industrially or for chemical analyses.

The second part of D6 (167 pages) treats the formation and properties of the organometallic compounds of the rare earths. The first section deals with compounds with alkyl, alkenyl, alkynyl, and aryl groups. The other sections deal with carbon monoxide, cyclopentadienide, substituted cyclopentadienide, indenide, heptamethylindenide, fluorenone, cycloheptatrienide, and cyclooctatetraenide compounds.

Volume D6 was published in 1983 and contains 304 pages. The cost is DM1012 (~U.S.\$360). The *Gmelin Handbooks* may be ordered from Springer-Verlag, 4005-Marketing Gmelin, Heidelberger Platz 3, D-1000 Berlin 33, West Germany.

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## \$\$ 1985 \$\$

Fiscal year 1985 is off to an encouraging start. Fourteen companies have renewed their support and two new members have been added to our family of sponsors. We appreciate the early support of these companies and wish to express our sincere thanks. The early contributors for fiscal 1985 are listed below. The number of years each company has been a sponsor is in parentheses.

- Allied Eneabba Limited, Western Australia (1)
- A/T Products Corporation, U.S.A. (5)
- Companhia Industrial Fluminense, Brazil (12)
- Davidson Specialty Chemical Company, Subsidiary of W. R. Grace and Company, U.S.A. (17)
- Denison Mines Limited, Canada (13)
- Ferro Corporation, Transelco Division, U.S.A. (9)
- Indian Rare Earths Limited, India (16)
- Lanthanide Research Corporation, U.S.A. (1)
- Mitsubishi Chemical Industries Limited, Japan (11)
- Reactive Metals and Alloys Corporation, U.S.A. (9)
- Reactor Experiments, Incorporated, U.S.A. (15)
- Research Chemicals, U.S.A. (17)
- Ronson Metals Corporation, U.S.A. (17)
- Treibacher Chemische Werke AG, Austria (13)
- Wako Bussan Company, Limited, Japan (16)
- Williams Strategic Metals, Incorporated, U.S.A. (3)

## Amorphous Magnetism 1944 - 1980

*Amorphous Magnetism and Metallic Magnetic Materials Digest* is a valuable book for anyone studying amorphous alloys, especially their magnetic properties. The result of a tremendous amount of work by A. R. Ferchmin and S. Kobe, the book contains a bibliography of 2,900 papers on the subject. The book begins with 3 chapters that give a brief introduction to the many systems that have been studied, and some of the properties that they possess with references to the bibliography. The 3 chapters all together are only 58 pages long. Chapter 4 has 187 pages of bibli-

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## Roskill Market Survey

Roskill Information Services Limited, 2 Clapham Road, London SW9 OJA, England, has compiled the Fifth Edition of *The Economics of Rare Earths and Yttrium*. Published in 1984, the survey contains 214 pages in the main section plus 60 pages of appendices. The report deals with the reserves, production of the ores, production of the rare earths, uses, imports and exports, and costs of the various rare earths or rare earth compounds.

This report is one of a series of 68 reports that cover a total of 85 metals and minerals, including one on scandium published in 1974. The cost of the rare earth report is DM1520 or U.S.\$760. For more information about individual reports or their contents contact Judith Chegwidden at the above address. The RIC would appreciate it if you would mention the *RIC News* as your source of information.

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ographical listings. Each citation is classified as experimental (E), theoretical (T), or review (R) with some being put into more than one category. The designation is part of the reference number, i.e. 959 ET. Chapter 5 contains a 38-page materials index, a 42-page Curie temperature-material index, and a 33-page author index. These indices facilitate the finding of papers on related systems. To keep the bibliography up to date, the authors will publish supplements in the *Journal of Magnetism and Magnetic Materials* with the first to cover 1981.

Published by North-Holland in 1983 the book contains 366 pages and costs Dfl.165.00 (U.S.\$70.25). It can be ordered from Elsevier Science Publishers, P.O. Box 211, 1000 AE

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## RE's in the News LIGHT RECORD

A laser system being developed for laser fusion by the Department of Energy (DOE) has set a new record for energy and power production. The Nova laser system located at the Lawrence Livermore National Laboratory in California delivered a record 57 trillion ( $5.7 \times 10^{13}$ ) watts of infrared laser light in a single pulse of only one billionth ( $1 \times 10^{-9}$ ) of a second. Only 8 of the 10 neodymium-glass solid state lasers that are in the Nova system were fired.

The Nova laser system is only an intermediate on the road to energy breakeven. Considerable further development is needed before the energy out from fusion will equal the energy in.

### Light Gadolinium

With medical demand more than doubling in the last two years, gadolinium-153 has become the top selling medical radioisotope for the Oak Ridge National Laboratory. With sales expected to reach \$500,000 this year, it is the sixth best seller of any of the radioisotopes, trailing only tritium, iridium-192, americium-241, krypton-85, and cobalt-60. The isotope is a key component of a scanning device for detection and therapeutic follow-up of bone mineral loss. The two characteristic radiations of  $^{153}\text{Gd}$ , a 100 keV gamma ray and a 43 keV x-ray, are compared after passing through bone and the different absorptions used to calculate bone density.

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