RARE-EARTH INFORMATION CENTER NEWS

INSTITUTE FOR PHYSICAL RESEARCH AND TECHNOLOGY
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COHENSION AND STRUCTURE

A new series of books with special interest for metallurgists is being published by North-Holland Physics Publishing. The series title is *Cohesion and Structure* and the editors are F. R. de Boer and D. G. Pettifor.

Volume 1 of the series is *Cohesion in Metals—Transition Metal Alloys*, edited by F. R. deBoer, R. Boom, W. C. M. Mattens, A. R. Miedema, and A. K. Niessen, and will be a useful reference book. It presents a complete collection of heat of formation data on binary metallics that contain at least one transition metal. Both solid compounds and liquid alloys are considered.

A "macroscopic atom" model for energy effects in alloys is developed in Chapter I. The two properties of pure metals that enter the model description of enthalpies of alloy formation are the electron density at the boundary of the Wigner-Seitz atomic cell, n_{ws}, and the chemical potential for electronic charge, ϕ^*.

Chapter II begins with a general discussion of enthalpies of alloy formation. The dependence of the model on various physical parameters is discussed and the model evaluated by comparing predicted and experimental values of various systems.

Chapter III, "Experimental and Predicted Enthalpies of Alloy Formation," contains 544 pages (72 percent of the book). Twenty-four transition metals are evaluated in their own section, including the rare earth metals Sc, Y, and La. Each section starts with data on relevant physical properties of pure metal A. This is followed by a schematic of published binary diagrams of element A with 57 elements. The first two tables list the predicted ΔH^{for} for compounds of element A with 57 elements (X). The next table lists experimental values for the heat of formation of various known compounds of these 57 ele-

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Indian Rare Earths, Limited

Wako Bussan Company, Limited

In our second year of honoring 20 year sponsors we have two companies eligible to join the 20-year club. Indian Rare Earths, Limited and Wako Bussan Company, Limited become the first members from outside the U.S.A. This brings to six the number of sponsors that have been with us 20 or more years. We owe these long-time benefactors a special thanks for their wonderful and continued financial and moral support.

** THANKS **

Aldrich Chemical Company, Incorporated

Nippon Yttrium Company, Limited

Two more companies, Aldrich Chemical Company, Incorporated and Nippon Yttrium Company, Limited have become eligible to have their names listed on our honor roll for 10 years of support. They join 31 others who have had their names in the honored spot in the *RIC News*. We are appreciative of all our sponsors but wish to express a special thanks to the 33 companies who have had their names listed in this special place of honor. Thirty-two of these 33 are still sponsors.

We Are Growing

With a month left in fiscal 1989, we have 136 members in our family of benefactors. While we lost some valued sponsors, temporarily we hope, this past year, we still set a new record for the total number of sponsors. We broke last years record of 122 by 14. Of the 42 contributors in the fourth quarter of our fiscal year, six were newcomers to our family.

The 42 additions to our list of benefactors during the fourth quarter, with the number of years they have been sponsors in parentheses, are listed below.

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General Electric Company, Materials Engineering Operation, U.S.A. (14)
D.F. Goldsmith Chemical & Metal Corporation, U.S.A. (1)
GTE Laboratories Incorporated, U.S.A. (17)

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CONFERENCE CALENDAR

International Conference on Materials and Mechanisms of Superconductivity and High-Temperature Superconductors M^2S-HTSC
Stanford, California, U.S.A.
July 23-28, 1989
RIC News, **XXIII**, [4] 4-5 (1988)

2nd International Symposium on Rare Earth Spectroscopy (RES-89)
Changchun, Jilin, China
September 9-14, 1989
RIC News, **XXIII**, [3] 2 (1988)

International Conference on the Physics of Highly Correlated Electron Systems (ICPHCES)
Santa Fe, New Mexico, U.S.A.
September 11-15, 1989
RIC News, **XXIII**, [4] 4 (1988) and **XXIV**, [1] 2 (1989)

XI Simposia Latino Americano Fisica del Estado Solido (XI SLAFES)
Caracas, Venezuela
October 23-27, 1989
RIC News, **XXIII**, [4] 4 (1988)

International Conference on Magnetic Phase Transitions (MPT '90)
Osaka, Japan
April 13-16, 1990
**This Issue*

1st International Conference on f-Elements (ICFE)
Leuven, Belgium
September 3-7. 1990
RIC News, **XXIII**, [4] 4 (1988) and **This Issue*

REE in Processes of Petrogenesis
Tashkent, USSR
September 1990
**This Issue*

**News Story This Issue*

PROCEEDINGS

W-Ti-RE-Sb '88

In the March 1, 1989, issue of the *RIC News* [**XXIV**, [1] 1 & 6 (1989)] the editor described a conference he attended in Changsha, Hunan Province, People's Republic of China. The proceedings of this conference are now available in a two volume set containing 1,353 pages.

W-Ti-RE-Sb '88 Proceedings of the First International Conference on the Metallurgy and Materials Science of Tungsten, Titanium Rare Earths and Antimony is available in the People's Republic of China (PRC) from International Academic Publishers, Xizhimenwai Dajie, Beijing Exhibition Centre, Beijing 100044, China.

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Outside the PRC the proceedings may be ordered from Pergamon Press plc, Headington Hill Hall, Oxford OX3 0BW, United Kingdom or Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, NY 10523, U.S.A. The price is U.S.$276.00 for the two volumes published in 1988. The editors of the proceedings are Fu Chongyue, Li Jianchun, and Li Songren.

The conference opened with 11 keynote lectures including 4 involving rare earths. The balance of the conference was devoted to sessions on extractive metallurgy and on materials science and applications devoted to W, Ti, RE, and Sb.

In the rare earth portion of the proceedings, there are 32 papers on extractive metallurgy. Topics included ore processing (especially flotation), solvent extraction, preparation of metals and alloys, and analytical chemistry. A total of 31 rare earth papers were published on materials science and applications. Applications included use of rare earths in steel, high T_c superconductors, automobile exhaust catalysts, permanent magnets, copper, aluminum, molybdenum, agriculture, superalloys, and galvanizing. Two papers dealing with the influence of rare earths on the properties of cemented carbides (TiC and WC) are published in the tungsten section of the proceedings.

TMS Rare Earth Symposium

A special symposium was held February 27-March 2, 1989, in conjunction with the 118th Annual Meeting of The Minerals, Metals & Materials Society (TMS). The proceedings of the seven sessions are available in the book, *Rare Earths: Extraction, Preparation, and Applications*. Edited by R. G. Bautista and M. M. Wong, the 405-page volume, copyright 1988, was available at the conference. It also can be ordered from TMS Book Order Department, 420 Commonwealth Drive, Warrendale, PA 15086 U.S.A. The cost is U.S.$125 (TMS members $70, student members $55).

Thirty-five papers are included in the book. The symposium includes papers covering research and developments in mineral processing; extraction and high-purity separation

(Continued on page 5)

New Dates for ICFE

RIC has received word that the dates for the *International Conference on f-Elements* (ICFE) has been changed from September 17-21, 1990, to September 3-7, 1990. To get on the mailing list for information, please write Professor C. Görller-Walrand, Department of Chemistry, Katholieke Universiteit Leuven, Celestijnenlaan 200F, B-3030 Leuven-Heverlee, Belgium.

MPT '90

The *International Conference on Magnetic Phase Transitions* (MPT '90) will be held April 13-16, 1990, in Osaka, Japan. The conference is sponsored by the Yamada Science Foundation. Papers are welcome on the following topics: magnetism in high fields, magnetism of rare earth and actinide compounds, magnetism of high T_c superconductors, magnetism and quadrupolar orderings, phase transitions in highly correlated systems, and phase transitions in random systems. To receive more information contact Professor Y. Miyako, MPT '90, Department of Physics, Faulty of Science, Hokkaido University, Sapparo 060, Japan.

PETROGENESIS

An international symposium, REE in Processes of Petrogenesis, will be held in September 1990 in Tashkent, Soviet Uzbekistan. It is being organized by the Soviet Committee of the International Lithosphere Program (ILP) in cooperation with the Institute of Geology and Geophysics of the Uzbeki Academy of Science.

The following topics are among those proposed:

1. REE distribution in various types of rocks,
2. Mineralogical and crystallochemical characteristics of REE and their role in petrogenesis, and
3. Methodological and analytical achievements in REE studies.

The official languages of the symposium are English and Russian and titles of papers to be presented should be submitted by August 25, 1989. For more information write Dr. Natalie B. Goleva, 22 Staromonetry per., Institute of the Lithosphere, USSR Academy of Science, 109180 Moscow, USSR.

Cariaco Trench

The 15 lanthanide elements (R) compose an extremely coherent group, commonly exist in the 3+ oxidation state, and exhibit similar chemical properties. While many display more than one valence in the laboratory, cerium and europium in nature often display valences of 4+ and 2+, respectively. These multiple oxidation states make their geochemistry interesting. The possible oxidation of Ce(III) to Ce(IV) or reduction of Eu(III) to Eu(II) leads to distribution anomalies of Ce and Eu when compared with the other 12 naturally occurring R, which are usually trivalent in nature.

Many other trace elements in nature (Mn, Fe, Cu, Cr, As, Sb, Se, I, Co, etc.) are also affected by their multiple oxidation states. However, Ce and Eu are unique: by defining an abundance anomaly *versus* neighboring R elements in the series it is possible to resolve oxidation and reduction from all other processing affecting their distribution. In seawater, the chemistries of Ce and Mn are similar. Both are released from shelf sediments, both exhibit reductive dissolution in suboxic waters, and both are commonly enriched in ferromanganese nodules.

The behavior of R in anoxic basins in the oceans is interesting because these basins provide a natural laboratory for studying oxidation-reduction reactions. Understanding the sensitivity of R to changing redox conditions is especially important because the Ce anomaly has been proposed as a tracer for large scale marine anoxia in ancient oceans.

The deep water of the Cariaco Trench was discovered to be anoxic in 1954. The Cariaco Trench is a 1,400 m deep depression in the Venezuelan shelf. It ranks among the larger and well-studied marine anoxic basins, yet the deep water levels of hydrogen sulfide (H_2S) are modest (50 micromol./kg) when compared with the Black Sea (300 μM) or with the Framvaren fjord (6000 μM). At a depth of about 300 m, no dissolved oxygen or sulfide is present. The dissolved oxygen increases rapidly as one goes up to the surface while the sulfide concentration increases as one goes deeper.

H. J. W. de Baar, C. P. German, H. Elderfield, and P. van Gaans stud-

(Continued in next column)

4*f*-4*f* Luminescence Centers in II-VI Compounds

If terms such as electric dipole transitions, magnetic dipole transitions, Stark levels, noncentrosymmetric systems and inversion symmetry have meaning to you, or if you work with phosphors, or lasers, or with photo-, cathodo-, or electroluminescence devices, this review is for you. Written by R. Boyn and entitled "4*f*-4*f* Luminescence of Rare-Earth Centers in II-VI Compounds," it was published in *Phys. Stat. Solidi (b),* **148,** 11-47 (1988).

After the introduction is a section of general remarks on the properties of rare-earth ions in crystalline solids, including electronic states and radiative and nonradiative transitions, and some of the equations and basic definitions used in the balance of the review.

The review focuses on zinc chalcogenides doped with various rare earths but some information on cadmium chalcogenides also is included. Among the topics discussed are energy levels, nature of the RE centers that are formed, radiative transition rates and line intensities, excitation mechanisms of photoluminescence, excitation mechanisms of electroluminescence, and nonradiative deexcitation mechanisms.

Boyn concludes the review with a short discussion of some problems that still need attention. The bibliography contains 161 citations.

(Continued from previous column)

ied these waters beginning in 1982. Recently they reported on the behavior of R, Mn, and Fe in the particulates and in the water as a function of the depth [*Geochim. Cosmochim. Acta,* **52,** 1203-19 (1988)]. They discuss the various changes in concentrations and in concentration ratios between elements. From these they propose a model to explain observations based on thermodynamics and stability constants. Above the oxic/anoxic interface most of the Ce is in the form of CeO_2 and is absorbed on or in the particulates. Below the interface, most of this Ce is dissolved out of the particulates and is present as different species in the water. They also have made predictions of what will happen to R in the Cariaco Trench and relative rates of cycling.

LETTER TO THE EDITOR

Dear Editor:

I recently received the March 1, 1989, issue of *RIC News* and was pleased to see that you included an article on CEAM II.

I should like to draw your attention, however, to two errors in the text that, perhaps, you could correct in the next issue.

1. The two-year extension of funding is 250,000 = ECU and not 25,000 = ECU.

2. CEAM II now is supported wholly by the European Commission's EURAM Advanced Materials Research Programme, and no longer supported by the STIMULATION Programme. This being so, neither Dr. L. Bellemin of DGXII-H1 nor the STIMULATION Programme are any longer involved in the management of CEAM project.

With best wishes
Dr. I. V. Mitchell
CEAM Scientific Project Director
Brussels, Belgium

Rare Earths Mining-Processing-Usage

S. Vijayan, A. J. Melnyk, R. D. Singh, and K. Nuttall presented a paper entitled "Rare-Earths Recovery Methods, Industrial Uses and Resource Utilization" at the Society of Mining Engineers' (SME) annual meeting, held January 25-28, 1988, in Phoenix, Arizona. A copy of the presentation may be obtained for U.S.$4.00 (SME members $2.50) from SME, Publications Sales, Box 625002, Littleton, CO 80162-5002, U.S.A. Ask for preprint 88-50. A similar paper, by the same authors, with the title "Rare Earths: Their mining, processing, and growing industrial usage," can be found in *Mining Engineering,* **41,** [1], 13-8 (1989).

Both papers give a brief, concentrated review of the technical side of the rare earth field. They examine the anticipated applications and demand for rare earth elements over the next decade. The papers have sections on reserves and reserve base, rare earth mineral processing methods, rare earth element separation and purification processes, present and anticipated uses, supply-demand predictions, current events, outlook for the rare earths, and conclusions.

RE Fertilizers

The *China Rare Earth Information Newsletter* [No. 12, February 1989] reported that, in 1988, the third largest use of rare earths in China was in fertilizers.

Rare earths have been used since the 1970s in agriculture in China. The *RIC News* has learned, through correspondence with Ning Jia-ben of the Research Center of RE Agricultural Application, Changsha, Hunan Province, People's Republic of China, that rare earths were applied to more than 30 kinds of crops in 1988. Some of the crops include rice, wheat, corn, sugar cane, sugar beets, tobacco, tea, cotton, peanuts, soybeans, and fruit. It is reported that the yield of food crops increased by 5 to 10 percent and cash crops by more than 10 percent. The Chinese report that for sugar cane, sugar beets, and fruit crops, application of rare earths not only increases the yield but also sugar content. It also has been reported that the quality of tea and tobacco and the color of flowers improve.

Professor Ning also reports that the effects of rare earths have been studied on pigs, silkworms, fish, and poultry with promising results. It is claimed that the rare earths prevent some diseases while, at the same time, increasing growth with less feed.

Several reasons have been advanced for the positive effects of rare earths on plants and trees. They are said to promote root growth and increase root activity in absorption and transportation of nutrients, and thus increasing the chlorophyll content of the leaves, which in turn increases photosynthesis.

The study of agricultural use of rare earths is a wide open area. The long-term effects of rare earths on soil and humans, the mechanism by which the increase in yield occurs, and the effect of each rare earth or of various mixtures are just a few of the questions that need answers.

Baotou Research Institute

The RIC has learned that Mr. An Zhili has retired as director of the Baotou Research Institute of Rare Earth (BRIR). RIC was notified that Mr. Ma Pengqi, who was the associate director will step into the director's chair. The BRIR includes the China RE Information Center.

Sponsors

(Continued from page 1)

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University of California-Davis, Department of Physics, U.S.A. (2)

Rare earth mine production in the U.S.A. and China was equal in 1988 at 17,000 mt

Von Hippel Award

Professor Jacques Friedel, head of the Physics Department at the University of Paris in Orsay, received the 1988 Von Hippel Award from the Materials Research Society at the 1988 MRS Fall Meeting in Boston. The award, the society's highest honor, was given in recognition of Friedel's many major contributions to a wide range of fields, within the domain of condensed matter sciences, that have profoundly influenced advances in materials science, metallurgy, and chemistry. Among the ideas that now bear his name are the Friedel sum rule, Friedel oscillations, and the Friedel model for oriented cross-slip of dislocations. His interests include the theory of metals and alloys, metallic bonding, dislocations, and disclinations in metals and alloys, including the rare earths.

Cohesion and Structure

(Continued from page 1)

ments with element A and the predicted value for comparison. Table 4 lists the predicted limiting partial enthalpies of solution of A in X and X in A and the enthalpies of mixing for the liquid binary. Table 5 is a comparison of known values of enthalpies of solution and mixing with predicted values for liquid alloys of element A. Each section concludes with a bibliography.

In Chapter IV, entitled "Further Applications of the 'Macroscopic Atom' Model," the authors demonstrate the applicability of the atomic model in predicting energy effects in metal science in general. Of special interest to rare earthers is the authors' treatment of the valence states of the rare earths, their enthalpies of vaporization, and the hydrides.

Volume 1 was published in 1988, is 758 pages long, and costs U.S.$131.50 in the U.S.A. and Canada, Dfl. 250.00 elsewhere. It may be ordered from Elsevier Science Publishers, P.O. Box 211, 1000 AE Amsterdam, The Netherlands, or from Elsevier Science Publishing Co. Inc., P.O. Box 882, Madison Square Station, New York, NY 10159, U.S.A.

High T_c Ceramic Superconductor Survey

High Temperature Ceramic Superconductors—An Analysis of the Technology and Future Applications is a market survey that covers fabrication trends; research and development activities of major worldwide centers; theories proposed; raw material availability and economics; applications and industrial trends; and future prospects, markets, and economics. The 154-page report is written by Dr. John Briggs and published by Materials Technology Publications.

The author predicts that the worldwide market could reach one billion dollars by the year 2000. The largest predicted market will be in electronics ($800 million by 2003), an average annual growth of 32 percent.

It is reported that the U.S. government allocation for superconductivity research for 1988 was $92 million and $124 million in 1989. In 1988, Japan's four main ministries for research funding received $73 million for superconductivity research. A total of $270 million is expected to be spent by Japan in the nine-year period (1987-1995).

The market survey costs U.S.$720 (£420) including airmail postage and packing. It may be ordered from World Business Publications Limited, 4th Floor, Britannia House, 960 High Road, London N12 9RY, England.

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Proceedings

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of the rare earths; reaction chemistry; preparation of metals and alloys; physical properties of alloys; applications in superconductors, magnets, catalysts, phosphors, etc.; and economics and marketing.

High T_c Superconductivity ACS Symposium

The American Chemical Society (ACS) has published *Chemistry of High-Temperature Superconductors II* as number 377 in the ACS Symposium Series. For a review of Volume I (ACS Symposium Series 351), see *RIC News,* **XXIII,** [2], 6 (1988). While Volume I included a focus on applications, research needs, and opportunities, Volume II reports on the rapid progress that has been made in the following areas of physical chemistry: theory, new materials, surfaces and interfaces, and processing. Edited by D. L. Nelson and T. F. George, the present volume was developed in advance of a symposium sponsored by the Division of Physical Chemistry at the 195th ACS meeting held September 25-30, 1988, in Los Angeles, California.

The first section on theory presents nine papers on new and exotic approaches and mechanisms. Included are papers on boson pairing, polarization induced pairing, and Wannier functions. In the section on new materials (eight papers) is one on the reaction of $Bi_2Sr_2CaCu_2O_{8+x}$ with $YBa_2Cu_3O_{7-y}$ at 950°C to produce a new, face-centered cubic material. The last two sections contain six papers that address the processing and applications of the ceramic superconductors.

This 24-chapter, 338-page book was published by ACS in 1988. It can be obtained for U.S.$64.95 in the United States and Canada, and for U.S.$77.95 elsewhere, from the ACS Distribution Office, Department 390, P.O. Box 57136, West End Station, Washington, DC 20037, U.S.A.

4th ICPMM Abstracts

The proceedings of the 4th International Conference on Physics of Magnetic Materials, held September 4-10, 1988, in Szczyrk-Bila, Poland, will be published—the invited papers in book form, and the contributed papers in a journal. M. W. Gutowski (one of the editors) told us that a few copies of the 304-page *Programme & Abstracts* booklet, which lists the 31 invited and 267 contributed papers, are available. The 304-page booklet contains abstracts of the papers presented at the conference. The booklet is available for a nominal fee of U.S.$20.00, shipping and handling included, from the chief librarian of the Institute of Physics, Polish Academy of Sciences, PL-02-668 Warsaw, Poland. The full proceedings will be reviewed in *RIC News,* when it becomes available.

(Continued in next column)

High T_c Sourcebook

Superconductivity Sourcebook, written and compiled by V. Daniel Hunt, was published in 1989 by John Wiley & Sons. The 308-page book is available for U.S.$32.95 from John Wiley & Sons, Inc., One Wiley Drive, Somerset, NJ 08873, U.S.A.

Hunt is president of the Technology Research Corporation, a company that specializes in the development of technology assessments in a wide range of fields.

The first chapter, "Overview of Superconductivity," starts with Onnes' discovery of superconductivity in mercury and describes the major steps leading up to discovery of the oxide high T_c materials. It also has a section on the fundamentals of superconductivity. The next three chapters discuss the applications of superconductors, their market potential, and their commercialization.

Chapters 5 through 13 are compilations of a great deal of interesting and useful information. The chapter headings are as follows: (5) "Superconductivity Definitions A-Z;" (6) "Acronyms and Abbreviations;" (7) "Periodical Literature;" (8) "Journal Papers;" (9) "Conference Proceedings and Papers;" (10) "Superconductivity Reference Books;" (11) "Information Resources Including National Information Centers, Newsletters, Journals, Reports, Abstracts, Directories, Video Resources, and Associations;" (12) "Products and Services," i.e. materials, hardware systems, software products, and education/demonstration kits; and (13) "Points of Contact," a list of names and addresses of over 1,300 people. The last chapter (14) briefly describes the federal superconductivity initiative as defined by former President Ronald Reagan.

LETTER TO THE EDITOR

Dear Editor:

I was delighted to read in the March 1, 1989, issue of *RIC News* that my former student, Robert J. Birgeneau, had won the American Crystallographic Association's Bertram Eugene Warren Diffraction Physics Award. I was somewhat distressed, however, to see that his first contact with rare earths was ascribed to Bell Labs in 1967. In fact, he did his Ph.D. thesis from 1963-1966 at Yale, where he worked on the ESR of Ce^{3+} and Gd^{3+} in $LaCl_3$. It would have been nice if we had had the credit. He also held a postdoctoral fellowship in Oxford (1966-1967) where he continued to work on rare earths.

My only reason for writing to you is that this illustrates something I notice frequently these days: that early history often is covered by the more recent.

Sincerely,
Werner P. Wolf
Raymond J. Wean Professor
Yale University
New Haven, Connecticut

Editor's Comment:

Unfortunately, we overlooked this aspect of Dr. R. J. Birgeneau's career and we apologize for this oversight.

MEGON AS

ELKEM of Norway and Mitsubishi Kasei Corporation of Japan have sold their respective interests in the MEGON group to Norsk Miljøteknologi AS (Norwegian Environmental Technology, Limited). As a consequence, MEGON's activities (formerly MCI-Megon A/S and A/S Megon & Company) were brought together under the same name, MEGON AS. President of MEGON AS will be Mr. Per H. Dybwad, who is also vice president of the parent company Norsk Miljøteknologi AS (NMT). NMT was established in January 1989 with the objective of offering solutions to various environmental problems. MEGON is starting an effort in this direction but stresses the fact that it is a secondary activity and that its focus is still on application of rare earth extraction technology. The company states that market efforts on rare earth oxides will be reinforced and production facilities upgraded and they are looking for cooperative partners in, or licensees of, the application of their solvent extraction expertise.

B. L. Bobryshev and Yu. P. Aleksandrova have reported on the effect of rare earths and other elements on the ignition of magnesium alloys. The paper appears in *Metalloved. Term. Obrab. Met.,* [3] 41-4 (1988) [Engl. Transl. *Metal. Sci. Heat Treatment,* **30,** 219-22 (1988)].

They separated the alloying elements into three groups: those that raise the ignition temperature, those with little effect, and those that lower the ignition temperature. Elements that have practically no effect include Mn, Zr, Cd, Si, and Cu and elements that lower the ignition temperature include Zn and Al. An alloy with 8 wt.% Al has an ignition temperature over 100°C lower than that for pure Mg.

The seven rare earths studied all raised the ignition temperature with La having the least effect and Er the most effect. A 0.1 wt.% addition of Er is sufficient to raise the ignition temperature by ~50°C. In fact, the authors report that with 0.7 wt.% Er, Dy, Gd, and Nd, or 0.5 wt.% Y, the alloys melt before they ignite.

Ke Ning Da Industrial

Ke Ning Da Industrial Company, Limited of Ningbo, China and Tredas International of the United States have reached agreement to form a joint venture to produce 40 tons of Nd-Fe-B magnets annually. The agreement will update Ke Ning Da's low productivity plant with new equipment from the U.S.A. [*China Rare Earth Information,* No. 10, 4 (August 1988)]

Shiokawa Award

The Shiokawa Award was established in 1987 by the Rare Earth Society of Japan. It was made possible by a donation from Dr. Jiro Shiokawa, professor emeritus of Osaka University and president of the society, upon his retirement from the university.

The first award was made in November 1988 to Professor Yasuo Suzuki of the Meiji University Department of Industrial Chemistry. Dr. Suzuki has been a professor at Meiji University, Kawasaki, Japan, since 1972.

Yasuo Suzuki was born in 1928 in Yokohama, Japan. He received his B.S. and M.S. from the University of Tokyo in 1954 and 1956, respectively. He worked with Professor Kenjiro Kimura, the pioneer of rare earth chemistry in Japan. He went to work at the Japan Atomic Energy Research Institute (JAERI) in 1957. He worked with Drs. Spedding and Powell of the Ames Laboratory from 1961-1964, received his Ph.D. from the University of Tokyo in 1965, and continued to work at JAERI until joining the Faculty of Engineering at Meiji in 1972.

His early studies involved ion-exchange separation of rare earths from fission products. In 1962, he began his long association with the study of rare earth stability constants. Professor Suzuki also is interested in precipitation of insoluble rare earth compounds including the hydroxides and fluoridesin solutions.

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