



RARE-EARTH INFORMATION CENTER NEWS

INSTITUTE FOR PHYSICAL RESEARCH AND TECHNOLOGY
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Rare Earth Spectroscopy

Volume 21 in Modern Problems in Condensed Matter Sciences is entitled *Spectroscopy of Solids Containing Rare Earth Ions*. The editors are A. A. Kaplyanskii and R. M. Macfarlane and in keeping with the aim of presenting a balanced picture, six chapters were written by Soviet and six by non-Soviet authors. Published by North-Holland in 1987, the 754-page book costs Dfl 410.00 (~U.S.\$193.00) and may be obtained from Elsevier Science Publishers, P.O. Box 211, 1000 AE Amsterdam, The Netherlands or, in the United States and Canada, from Elsevier Science Publishing Company, Inc., P.O. Box 1663, Grand Central Station, New York, NY 10163. The publishing house "Nauka" publishes a Russian version.

Crystals and glasses, with rare earths, are unique and important solid state systems. Their characteristic properties stem primarily from rare earth ions having an unfilled 4f electron shell screened from the crystal field by outer 5s and 5p electrons.

The chapter titles and authors are as follows: (1) "P. P. Feofilov and the spectroscopy of activated crystals," by A. A. Kaplyanskii and A. I. Ryskin; (2) "Crystal field and electron-phonon interaction in rare-earth ionic paramagnets," by B. Z. Malkin; (3) "Coherent transient and holeburning spectroscopy of rare earth ions in solids," by R. M. Macfarlane and R. M. Shelby; (4) "Experimental studies of energy transfer in rare earth ions in crystals," by W. M. Yen; (5) "Energy transfer in crystals," by D. L. Huber; (6) "Spectral migration of excitations in rare-earth activated glasses," by T. T. Basiev, V. A. Malyshev, and A. K. Przhhevuskii; (7) "Spectroscopy of collective states and cooperative transi-

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1787—1987 Bicentennial Booklet

As promised [*RIC News*, XXI, [4], 1 (1986)], the RIC has put the stories submitted for the bicentennial year into a booklet. IS-RIC 10 was assembled by editors K. A. Gschneidner, Jr., and J. Capellen. The typesetting and printing was generously donated by North-Holland Physics Publishing. For a free copy contact the RIC or write the publishers at P.O. Box 103, 1000 AC Amsterdam, The Netherlands.

The booklet contains a preface, a letter to the editor, the editor's reply, and the following nine stories: *"How many REs?," by K. A. Gschneidner, Jr.; "Story of RE Names," by Georg K. Brauer; *"Necessity is the Mother of Invention," by Werner Fischer; "Element 61," by T. V. Swaminathan; "Electronic Structure vs. Chemistry," by Christian K. Jørgensen; "Nobel Prize 200 Years Later?," by Andrzej Szymanski; *"Luminescence Applications," by Mel Tecotzky; *"Powerful New Magnet Material Found," by Arthur L. Robinson; and "Past, Present and Future of Rare-Earth Metallurgy," by K. A. Gschneidner, Jr.

Condensed versions of the letter, the editor's reply, and the four papers marked with an * appeared in the four 1987 issues of the *RIC News*.

RE Availability

James B. Hedrick, physical scientist and geologist with the Bureau of Mines of the U.S. Department of the Interior, Washington, D.C., has written a paper entitled "Availability of Rare Earths" [*Ceramic Bulletin*, 67, 858-61 (1988)]. He discusses the principle ores involved in the production of rare earths and the limitations imposed by their compositions and reserves.

IANDELLI RETIRES

The RIC has received word that Professor A. Iandelli will retire at the end of summer. He has been a full professor at the University of Genoa for nearly 40 years. Earlier this year he was awarded the Gold Medal of the Ministero della Pubblica Istruzione, one of Italy's most prestigious awards for scientific, cultural, and teaching activities.



Professor A. Iandelli was born in Florence, Italy, on November 7, 1912. After earning his doctor's degree he began his scientific career at the Institute of General Chemistry in Florence, then moved to Genoa where he was promoted to full professor in 1949. In 1957, he became director of the Institute of Physical Chemistry of the University of Genoa.

Iandelli is truly one of the pioneers in solid state chemistry. Since 1933, he has been active in the study of metallic and semimetallic systems, with special interest in those involving rare earths. The main idea of his work was to try to understand the metallic bond through systematic examination of the physical and chemical properties of these systems. His research involved the production, collection, and systematic examination of crystallographic data of rare earth intermetallics. One result was the discovery of the linear correlation between lattice parameters and atomic radii of the rare earth metals. He was one of the first to suggest the possibility of characterizing these compounds by measuring their magnetic properties and thus was one of the first to discover the existence of compounds in which rare earths show the fascinating property of

(Continued on page 5)

CONFERENCE CALENDAR

2nd International Conference on Giant Magnetostrictive Alloys and Their Impact on Actuator and Sensor Technology
Marbella, Spain
October 12-14, 1988
RIC News XXIII, [2] 2 (1988)

1st International Conference on Metallurgy and Materials of Tungsten, Titanium, Rare Earths, and Antimony (W-Ti-RE-Sb'88)
Changsha, People's Republic of China
November 5-8, 1988
RIC News, XXII, [4] 2 (1987)

TMS-AIME Rare Earth Symposium
Las Vegas, Nevada, U.S.A.
February 27-March 3, 1989
RIC News, XXII, [2] 2 (1987)

International Symposium on Magnetoelasticity and Electron Structure of Transition Metals, Alloys and Films (ISOMES '89)
Duisburg, West Germany
March 20-22, 1989
RIC News, XXIII, [2] 2 (1988)

*2nd International Symposium on Rare Earth Spectroscopy (RES-89)
Changchun, Jilin, China
September 9-14, 1989
This issue

*New Listing

Not-So-Rare Earths

The rare earth elements (REEs) are ubiquitous, being present in low concentrations in virtually all minerals. They also are not exactly rare as all but one are more abundant in the earth than gold, silver, mercury, or tungsten. Fortunately, some minerals exist that make production of the rare earths feasible because many of our everyday, as well as industrial and scientific endeavors involve materials in which rare earths are included. The relative abundances of the REEs in minerals reflect the interaction of their unique chemical properties with the diverse processes that took place and are taking place in the upper mantle and crust of the earth. Investigators, by studying the pattern of REE distribution and isotopic ratios in different minerals can gain geologic knowledge that benefits earth science and ultimately modern industry and mankind in general.

To help the layman understand some of these geological processes and their consequences, G. K. Muecke and P. Möller wrote "The Not-So-Rare Earths" [*Sci. Amer.* 258, No. 1, 72-7 (1988)].

RES-89

The second international symposium on Rare Earths Spectroscopy (RES-89) will be held September 9-14, 1989, in Changchun, the capital city of Jilin province, in northeast China. The aim of the symposium is to critically review recent developments and results, with special emphasis on the following topics: (1) intensities of $f-f$ and $f-d$ transitions, hypersensitivity, and influence of environment and crystal field on spectroscopy; (2) dynamical processes, nonradiative relaxation and energy transfer, cooperative phenomena, up-conversion, electron-phonon interactions, and self-quenching; (3) nonlinear optical processes, multiphoton absorption, and four-wave mixing; (4) spectroscopic methods in structural studies; (5) site-selective spectroscopy and laser induced line-narrowing and hole-burning; (6) spectroscopy of rare earth in high T_c superconductor and semiconductor hosts of the III-V and II-VI types (7) electroluminescence; (8) new luminescent materials and technology (lasers and phosphors); and (9) applications of luminescent materials.

The language of the symposium is English and more information may be obtained from Professor Su Qiang, Changchun Institute of Applied Chemistry, Academia Sinica, Changchun 130022, The People's Republic of China.

Magnetic Materials

The *Proceedings of the 3rd International Conference on Physics of Magnetic Materials*, held September 9-14, 1986 in Szczyrk-Bila, Poland, have been published by World Scientific Publishing Company. Edited by W. Gorzkowski, H. K. Lachowicz, and H. Szymczak, the 585-page book, published in 1987, costs U.S.\$74.00. It may be ordered from World Scientific Publishing Co. Pte. Ltd., Farrer Road, P.O. Box 128, Singapore 9128 or from World Scientific Publishing, 687 Hartwell Street, Teaneck, NJ 07666, U.S.A. The book, *Physics of Magnetic Materials*, contains 28 of the 30 invited review papers presented at the conference. The papers are on ferrites, hard magnetic materials based on rare-earth elements, thin magnetic films, amorphous materials, and spin glasses. Sixteen papers contain material on rare earths. The 182 contributed papers, 84 of (Continued in next column)

New Magnet Array

A new type of magnet array that will be a key component in the world's brightest source of x-rays for material research has passed its first tests with complete success, according to Gopal Shenoy of Argonne National Laboratory. The device, called an "undulator," is the prototype for dozens that will be used in the 7-billion-electron-volt Advanced Photon Source (APS) to be built at Argonne.

The APS undulator was designed by a team from Argonne in collaboration with Cornell University, Ithaca, New York, and Spectra Technology of Bellevue, Washington. Spectra put the prototype together. Technical details were to be reported at the International Synchrotron Radiation Instrumentation meeting August 20-September 2, in Tsukuba, Japan.

The prototype undulator contains more magnets than any array of its kind ever built for a synchrotron X-ray source. It uses 244 neodymium-iron-boron magnets. The 122 poles cause the particle beam to wiggle, or undulate, 122 times over its 2m length and thus to emit high-energy X-ray beams.

The undulator was tested at the Cornell High Energy Synchrotron Source (CHESS) using a beam of electrons. X-rays emitted in the test were used to prove the value of the proposed APS. One example, in one 10-billionth of a second, a flash x-ray photograph of protein crystals was made that might take days using conventional x-ray equipment.

While the test used a beam of electrons, the APS will use positrons. They will be accelerated to nearly the speed of light and stored in an ~370m diameter ring. Arrays of powerful magnets—undulators—will vibrate the positrons, causing them to emit beams of intense, highly focused x-rays 10,000 times as powerful as any available today.

Design and construction of the 7-GeV APS is funded by the U.S. Department of Energy. The APS is expected to yield practical advances in such areas as petrochemicals, medicine, metallurgy, plastics, electronics, and coal research.

(Continued from previous column)

which have been published in the July and September 1987 issues of *Acta Physica Polonica*, are listed in the appendix.

Neutrons meet Water

The investigation of ions in aqueous solutions has involved a great variety of experimental techniques. Many of these methods measure macroscopic or bulk properties in an attempt to learn about microscopic properties, e.g. enthalpies and entropies of hydration, partial molal volumes, and transport properties. However, upon delving into the details of these macroscopic methods, one finds they must make assumptions and rely on models in order to get information about the individual ions in solution.

Modern techniques, such as nuclear magnetic resonance and scattering of x-rays or neutrons, can directly probe the microscopic properties of hydrated ions. Neutron scattering, coupled with isotopic substitution of the ion of interest, is especially powerful according to R. L. Hahn. In his paper, "Volumes of Aqua Ions from measured Neutron Radial Distribution Functions" [*J. Phys. Chem.* **92**, 1668-75 (1988)], he demonstrates that the results of neutron-scattering experiments can be analyzed to yield the radii and volumes of hydrated cations. These results were used to define a simple model that predicts reasonable values of partial molal volumes. Thus, measurements of hydration on a microscopic scale lead to predictions of a macroscopic aspect of hydration. The simple geometrical properties of the model allowed him to extend the analysis to obtain values of the volumes of the primary hydration shells of the aqua ions and of the average volumes of the electrostricted water molecules in these hydration shells. Among the solutions he studied to develop the model were DyCl_3 and NdCl_3 in D_2O . A comparison of calculated values with values obtained from transport experiments is presented for lanthanide ions.

Mitsubishi Metal

Mitsubishi Metal Corporation (MMC) of Japan has appointed Mr. Hiroshi Sakurai president of Mitsubishi Metal America Corporation (MMAC). Mr. Sakurai was formerly director of MMC Central Research Institute. MMAC, located in New York, was established about two years ago to handle legal and business matters of MMC subsidiaries in the United States as well as represent MMC.

Valence Fluctuations

Proceedings of the Fifth International Conference on Valence Fluctuations, held January 5-9, 1987, in Bangalore, India, are contained in a book entitled, *Theoretical and Experimental Aspects of Valence Fluctuations and Heavy Fermions*. Edited by L. C. Gupta and S. K. Malik, the 1987 book contains 778 pages, costs U.S.\$125.00 (\$150.00 outside United States and Canada), and may be obtained from the publisher, Plenum Publishing Corporation, 233 Spring Street, New York, NY 10013, U.S.A.

The book contains 37 of 39 invited papers and 89 of 110 contributed papers presented at the conference. All papers were refereed. The book ends with two papers that sum up the experimental and theoretical aspects of the papers presented at the conference.

The phenomenon of valence fluctuation has fascinated and excited physicists in recent years. The many interesting phenomena occurring in mixed valent materials, the flexibility of modifying their physical properties, and the possibility of synthesizing a wide variety of new such materials seem to be key factors in this continuing interest. Topics that contribute to these factors and are discussed in the book are phase transitions in heavy-electron materials, phenomenological relationships in heavy Fermi liquids, correlations between valence and electronic structure as studied by EXAFS in RM_2X_2 , coherence in CePd_3 , and phase diagram of the Kondo lattice.

Chinese Lab

A new open-laboratory for study of the rare earths was established in August 1987, at the Changchun Institute of Applied Chemistry in Changchun, China. The laboratory will have research programs devoted to (1) chemistry and physics of rare earths, (2) separation chemistry of rare earths, (3) rare earth coordination compounds and organo-metallic compounds, (4) rare earth fused salt chemistry, and (5) theoretical investigations. Half of the faculty of 30 will be from the Changchun Institute and half will be visiting scientists. The director of the laboratory and the head of the laboratory academic committee are Professors Ni Jiazan and Xu Guangxian.

Seiko Epsom

Seiko Epsom of Japan has announced the development of a new, less expensive manufacturing method for rare earth magnets that still have excellent magnetic properties. It is said to be applicable to mass production as well as being suited to small scale operations.

The alloying elements are melted and mixed into an alloy, the molten metal held at approximately 900°C , and then cast into the desired shapes. It does not require pulverizing, sintering, or quenching and thus shortens the processing time.

While not suitable for Sm-Co or Nd-Fe-B magnets, Seiko Epsom researchers found that it does work with Pr-Fe-B magnets to which a small amount of copper has been added. This new magnet supposedly is equivalent to Nd-Fe-B magnets, has high mechanical strength with less cracking, and is less prone to rusting.

The new magnets, according to Seiko Epsom, should cut the costs of magnetic resonance imaging facilities at hospitals and high performance motors.

Russian Acquisitions

The RIC has received numbers 26, 27, and 28 of *Redkozemel'nye Poluprovodniki i Drugie Soedineniya RZM. Ukazatel' Otechestvennoi i Inostrannoi Literatury (Rare Earth Semiconductors and Related REM Compounds. Index of Russian and Foreign Literature)*, edited by V. P. Zhuze. They are published by Biblioteka Akademii Nauk SSSR, Leningrad, USSR, and cost only 0.30 ruble each. The bibliographies are produced in conjunction with the Fiziko-Tekhnicheskii Institut im A. F. Ioffe Akademii Nauk SSSR. Numbers 26 and 27 were published in 1987, while 28 was published in 1988. They contain 540, 490, and 676 citations, respectively, with the entries not limited to semiconductors but including papers on magnetic materials, superconductivity, etc. The references are printed in English, Russian, French, or German. In 26 and 27, but not 28, the foreign references have a Russian translation and the Russian entries have an English translation. In most cases the number of references cited in each entry is included as part of the listing.

GMELIN HANDBOOK

Volume A6b of system 39 of the *Gmelin Handbook of Inorganic Chemistry* deals with geochemistry. It is divided into three sections related to the geochemistry of rare earths, excluding scandium, in the hydrosphere, atmosphere, and geosphere.

The 207-page book was published in 1988 by Springer-Verlag and costs DM 989 (~\$525.00). It may be ordered from Springer-Verlag, 4005-Marketing Gmelin, Heidelberger Platz 3, D-1000 Berlin 33, West Germany.

The section on the hydrosphere is 89 pages and deals with oceanic and nonoceanic waters. Nonoceanic waters include lakes and rivers, ground and subsurface water, and mineral and thermal waters. Subsections deal with origin of the elements; mode of occurrence, distribution, and content; and the migration and removal of the rare earths.

The section on the atmosphere is 47 pages and describes the origin and mode of occurrence; transportation; regional and temporal variations in concentrations; and removal of the rare earths from the atmosphere.

The section on the geosphere includes discussions on the source, distribution, and behavior of the rare earth elements in terrestrial environments with a small section on extraterrestrial environments. Among the topics covered are geochemical variations and differentiation of the REE in the core, mantle, and crust of the earth.

The book has one major flaw common to many publications. It continuously talks about yttrium and the rare earth elements when it should be yttrium and the lanthanides. Yttrium and scandium, as well as the lanthanides, are rare earths.

Elliot Cresson Medal

Harry G. Drickamer, professor of chemical engineering, chemistry, and physics, University of Illinois, Urbana-Champaign, is the winner of Franklin Institute's Elliott Cresson Medal. The award was in recognition of his research on the effects of extremely high pressure on the physical and chemical characteristics of materials. His work on many of these systems involves rare earths.

MRS Symposium 99

High-Temperature Superconductors is the title of Materials Research Society (MRS) Symposium Proceedings Volume 99. The symposium was held November 30-December 4, 1987, in Boston Massachusetts. Published by MRS in 1988, the 1,004-page book was edited by M. B. Brodsky, R. C. Dynes, K. Kitazawa, and H. L. Tuller. It contains 214 papers, including 9 plenary lectures and 27 invited talks. Twenty-four papers were presented in sessions devoted to "Preparation of Bulk Materials," 31 at sessions devoted to "Films, Wires, Etc.," 74 on "Physical Properties and Theory," and 59 on "Substitution, Structure, Etc." The book costs MRS members U.S.\$39.00, nonmembers in the U.S.A. \$46.00, and for other nonmembers \$53.00. It may be ordered from Publications Department, Materials Research Society, 9800 McKnight Road, Suite 327, Pittsburgh, PA 15237, U.S.A.

Superconducting Materials

Japanese Journal of Applied Physics (JJAP) Series 1 *Superconducting Materials* reports on two special research projects of the Ministry of Education, Science and Culture of Japan. The first, on new superconducting materials, was carried out with 58 senior scientists from April 1984 through March 1987. Its aim was to investigate the mechanism controlling the critical temperature, T_c , in different classes of superconducting materials and to raise T_c if possible. In view of the dramatic discovery, in 1986, of the superconducting high- T_c oxides, a new program with 15 selected scientists was created to study high temperature oxide superconductors.

This book contains reports from individual scientists, as well as historical surveys and summary reports by the project leaders. About half the book is devoted to high T_c oxides and half to other inorganic and organic superconductors. Theoretical and experimental papers are included as well as papers on preparation.

The 318-page book contains 84 papers and was edited by S. Nakajima and H. Fukuyama. It costs 5,000 Japanese yen (~U.S.\$38.00) and may be ordered from Publications Office, Japanese Journal of Applied Physics, Daini-Toyokaiji Building, 24-8 Shinbeshi 4-Chome, Minato-Ku, Tokyo, 105 Japan.

A PRACTICAL GUIDE

Technology Futures Incorporated has published a "Future Focus Report" entitled *Superconductivity: A Practical Guide for Decision Makers*. The 310-page report was written to provide decision makers with a foundation for understanding new developments in the high T_c superconductivity field and evaluating their practical significance to their organizations. It gathers together the many applications for high temperature superconductors and gives an estimate of how long it will take for these applications to have commercial fruition. It presents a glossary of superconductivity terms, describes the various superconductor forms (bulk, flexible, surface coatings), and gives practical advice as to what is important in the commercialization of the 1:2:3 superconductors. It lists both the pitfalls and rewards of attempting to cash in on this newest innovative discovery.

The report costs U.S.\$595.00 and may be ordered from Technology Futures, Inc., 6034 West Courtyard Drive, Suite 380, Austin, TX. 78730-5014, U.S.A.

Permanent Magnet Review

Kaplesh Kumar of the Charles Stark Draper Laboratory, Cambridge, Massachusetts, has written a well documented (306 references) review of RTM_5 and R_2TM_{17} permanent magnets, where R represents any rare earth, but mainly samarium, and TM represents a transition metal, which in most cases is cobalt.

These magnets have developed rapidly since Hoffer and Strnat published their study of YCo_5 in 1966. In this review, published in *J. Appl. Phys.* 63, R13-R57 (1988), Kumar traces the history, reviews the reasons they make good magnets, compares the properties of magnets with different compositions, and ends with a review of fabrication and thermal processing procedures.

Additional developments in RTM_5 and single-phase R_2TM_{17} magnets are not expected, according to the reviewer, but two-phase alloys seem to hold promise. High intrinsic coercivities have been attained in magnets having a TM:R ratio of 8.35 and 8.92.

Thin Films

The American Institute of Physics (AIP) has published *Thin Film Processing and Characterization of High-Temperature Superconductors* containing 54 papers presented at an American Vacuum Society (AVS) topical conference on November 6, 1987. AIP conference proceedings No. 165 (AVS series No. 3) was published in 1988, contains 478 pages, and was edited by J. M. E. Harper, R. J. Colton, and L. C. Feldman. The book costs AIP members U.S.\$50.00 and nonmembers U.S.\$62.50 and may be ordered from American Institute of Physics, Marketing Services, 335 East 45th Street, New York, NY 10017. Nonmembers from outside the United States and Canada should send orders to IOP Distribution Ltd., 7 Great Western Way, Bristol BS1 6HE, England.

The book is divided into two sections, one on thin film processing and the other on characterization. Among the processing methods discussed are evaporation, sputtering, laser ablation, spin on/pyrolysis, and plasma spray. Also discussed in section one is substrate effects. Characterization methods discussed include electron spectroscopies, surface and interface chemistry, Raman scattering, ion sputtering, positron annihilation, and ion back-scattering. Applications and process parameters are discussed throughout the book. Most of the superconductors are Y-Ba-Cu-O varieties but some other rare earths are also discussed.

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OCEANIC CHEMISTRY

Work on the rare earth element (REE) chemistry of seawater is fairly new. The first concentration measurements were reported 25 years ago by Goldberg et al. [*J. Geophys. Res.* **68**, 4209-17 (1963)], however, only in the last five years has a concerted effort been made to try and understand what controls oceanic chemistry. Professor H. Elderfield, of the Department of Earth Sciences, of Cambridge, has written a review that details these efforts and their findings [*Phil. Trans. Roy. Soc. London A*, **325**, 105-26 (1988)].

Studies of the concentrations and distributions of REEs in seawater offer a unique insight into marine trace-element geochemistry. The REEs are affected by nearly all the important processes operating in the ocean: river, atmospheric, and hydrothermal input; absorption and scavenging onto particles; coprecipitation; ion pairing; and redox reactions. The REEs are generally rather similar, yet nevertheless, show subtle but significant differences that vary in a predictable manner. The response of the oceans to these small differences in physicochemical properties provides an extremely useful tool that allows the elucidation of the mechanisms that control the concentrations and distributions of not only the REEs but other trace metals as well.

Because of their unique chemical characteristics, the REEs provide information as tracers of element source and reactivity. Their absolute and relative concentrations in ocean waters reflect their input from rivers, aeolian transport, and hydrothermal vents; their interaction with the biochemical cycle of surface absorption and oxidation on particles and regeneration at deeper depths; and the effects of advective transport. Within the lanthanides, Ce anomalies occur in response to oceanic redox conditions; Eu anomalies in response to aeolian and hydrothermal input; and Nd isotopic variations reflect element sources. The concentration patterns and Nd isotopic variations allow the effects of vertical particle flux and of lateral advection to be separated.

Since 1983 the use of rare earths in China has nearly doubled. In the same time production has nearly quadrupled.

China & Japan Pact

China and Japan reached a significant agreement in May 1988 to jointly extract, refine, and use rare earths. This came as a result of a proposal early last year by Japan's Ministry of International Trade and Industry which wanted a steady and continuous supply of rare earths from China. The Chinese for their part, hope to get advanced technology and machinery from Japan to update their methods of mining, extraction, and processing of rare earths.

The pact was signed in Beijing by Chinese Vice-Minister Ye Qing, who leads the State Planning Commission, and Heiichi Hamaoka, director of the Japanese Agency of Natural Resources.

The agreement specifies that regular conferences will be held, attended by both government and non-government representatives of the two countries. The meetings will be forums to exchange information on demand, trade, extraction, processing, and technology pertaining to the rare earths. The initial conferences will be held this fall in Japan at which specific cooperative projects are expected to be proposed.

Correction

In the "Aminoff Gold" news item under "honors" [*RIC News XXIII*, [2] 4 (1988)] we implied that Dr. E. F. Bertaut received the Doctor of Science Honoris Causa from the University of Uppsala in 1986, but in fact he received it in 1977.

Iandelli

(Continued from page 1)

"valence fluctuation." Professor Iandelli has devoted his most recent research to the study of the influence of pressure and temperature and of "chemical pressure" on the valency state of Ce, Eu, and Yb in their binary and pseudobinary intermetallics.

Professor Iandelli has authored many papers of fundamental importance in solid state chemistry. He has been a member of the Editorial Board of *The Journal of the Less-Common Metals* since its inception in 1959 and of the *Revue de Chimie Mineral* since 1976.

The RIC wishes him the best in his retirement years.

PETER WOHLFARTH

Professor E. Peter Wohlfarth died of cancer on March 16, 1988, at the age of 63. Peter Wohlfarth was born in Gleiwitz, Germany, on December 7, 1924. His family fled to England in 1939 where he became a true Yorkshireman, developing a lasting interest in cricket and choral music.

He was educated at Leeds University, graduating in physics in 1946, earning a Ph.D. in 1948 while studying with E. C. Stoner, and receiving the C.Sc. degree in 1957. He became a lecturer in the Department of Mathematics at Imperial College in London in 1949 and since 1964 had been professor of theoretical magnetism there.

Peter devoted much of his life to the study of magnetism and magnetic materials. He was concerned with the basic questions of how and why magnetism occurs in metals and with the behavior of systems of fine magnetic particles. He edited volumes 1-5 of *Handbook on Ferromagnetic Materials* and helped edit volumes 1-18 of *Selected Topics in Solid State Physics*.

He was a fellow of the Institute of Physics (Great Britain); a fellow of the Institute of Electrical and Electronics Engineers (IEEE); and in 1984, recipient of the IEEE Centennial Medal. Less than two weeks before his death, he traveled to Vienna to receive an honorary doctorate from the Technische Universität Wien.

Novel Superconductivity

Novel Superconductivity, edited by S. A. Wolf and V. Z. Kresin, is the title of the proceedings of an International Workshop on Novel Mechanisms of Superconductivity held June 22-26, 1987, in Berkeley, California. High T_c oxides are the largest single subject covered, however, heavy fermion, organic, and low carrier concentration superconductors are an important part of the proceedings and articles by leaders in these fields are included. The book contains 141 articles on the various kinds of superconductors and is 1,134-pages long. The book costs U.S.\$125.00 in the United States and Canada and U.S.\$150.00 elsewhere. It may be ordered from Plenum Publishing Corporation, 233 Spring Street, New York, NY 10013, U.S.A.

\$\$\$ 1989 \$\$\$

Fiscal 1989 has seen continued growth in the number of new sponsors and continued support from old friends. Of the 34 benefactors, 7 are new to our family of sponsors and 7 have contributed to the support of RIC for 15 years or more.

The 33 sponsors wishing to be listed, with the number of years they have been sponsors in parentheses, are listed below.

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 Wheeler Associates, U.S.A. (3)

RE Spectroscopy

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