RARE-EARTH INFORMATION CENTER NEWS

ENERGY AND MINERAL RESOURCES RESEARCH INSTITUTE
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FRANK H. SPEDDING

The world lost one of its scientific leaders and the rare earth field lost one of its founding fathers with the death of Professor Frank H. Spedding at his home in Ames, Iowa, on December 15, 1984. Dr. Spedding was born of American parents on October 22, 1902 in Hamilton, Ontario, Canada. He grew up in Michigan and received his baccalaureate in 1925 and master's degree in chemical engineering from the University of Michigan in 1926.

Frank Spedding earned his Ph.D. degree in physical chemistry in 1929 under G. N. Lewis, one of the pioneer physical chemists in the world, at the University of California, Berkeley, California, U.S.A. A temporary instructorship lasting one year and a two year Rockefeller Foundation national research fellowship allowed Spedding to stay at Berkeley for three years. During this time, he worked on band splitting in the absorption spectra of crystalline rare earth compounds. For this work, he won the most prized of his many honors, the Langmuir Prize awarded by the American Chemical Society to a

(Continued on page 6)

SAM LEGVOLD

Another pioneer in the rare earth research area was lost with the death in Ames, Iowa, of Dr. Sam Legvold on February 17, 1985. Dr. Legvold and his many coworkers used magnetic susceptibility, resistivity, thermoelectric power, thermal conductivity, and magnetostriction to study the magnetic properties of the rare earth metals and their alloys.

Dr. Legvold was born in Huxley, Iowa, U.S.A., on January 8, 1914. Huxley is a small community with a Norwegian heritage only 10 miles from the Iowa State University campus where Sam gained his world renown as a researcher and teacher. He received a bachelor's degree in 1935 from Luther College and a master's degree in 1936 from Iowa State College. Both of these degrees were in mathematics. He was a Lydia Roberts Fellow at Columbia University in New York, then an assistant professor of physics at Luther College for 2 years. He returned to Iowa State College as a graduate assistant in 1939 and, except for 1943-44 when he was a contract employee with the Navy in Washington, D.C., he spent

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E. O. WOLLAN

Ernest O. Wollan died on March 11, 1984 at the age of 81. A pioneer in nuclear energy, he made notable and varied contributions to physical knowledge and techniques. He was a founder of health physics and a leader in developing the science of neutron diffraction. He invented and perfected the use of photographic methods to measure gamma-ray dosage, the now universally adopted radiation badge. He was present, with Dr. F. H. Spedding and others, at the start-up of the first nuclear chain reaction at the University of Chicago on December 2, 1942. Wollan, W. C. Koehler, and others at the Oak Ridge National Laboratory worked to adopt neutron scattering techniques to determine magnetic structures and to measure crystal fields of the rare earth metals, compounds, and alloys.

Attractive Garnets

Volume 114, number 1/2 of *Thin Solids Films* is a special issue on the subject of magnetic garnet films. Dated April 13, 1984 and having 240 pages, the cost of the special issue is U.S.$59.50. It can be obtained from Elsevier Sequoia S.A., P.O. Box 851, 1001 Lausanne 1, Switzerland.

The volume contains eight papers with the first two dealing with different methods of preparing garnet films. The first is a review of ion implantation in bubble garnets while the second reviews the liquid phase epitaxial growth of bismuth-substituted iron garnet layers. The next four papers discuss the structural properties, the magnetic and magneto-optical properties, the electrical properties, and the microwave properties, respectively. The seventh paper reviews the major developments in the last decade in the field of magneto-optical devices based on garnet

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MEETINGS

Magnetic Memories

As a follow-up to the Conference on Magnetic Materials for Application, a satellite conference will be held June 6-7, 1985 entitled Magnetic Memories. The conference will be held at the Institut des Sciences and Techniques Nucléaires, Grenoble, France. The program will consist of papers on developments in magnetic recording, bubble memories, and comparisons of various recording devices and methods. An exhibition of related apparatus will take place in a nearby area. For more information contact Mr. J. Chenais, S.E.E., 305 Chemin des Arriots, Montbonnot, 38330 St. Ismier, France.

CONFERENCE CALENDAR

5th Intl. Conf. on Crystalline Field and Anomalous Mixing Effects in *f*-Electron Systems
Sendai, Japan
April 16-19, 1985
RIC News XIX [4] 4 and 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
RIC News XIX [3] 2 and XIX [1] 3 (1984)

Materials and Mechanisms of Superconductivity
Ames, Iowa, U.S.A.
May 29-31, 1985
RIC News XIX [3] 2 (1984)

Magnetic Materials for Applications (M.M.A.85)
Grenoble, France
June 3-5, 1985
RIC News XIX [3] 2 (1984)

*Magnetic Memories
Grenoble, France
June 6-7, 1985
This issue

Intl. 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] (1984)

(Continued in next column)

Finances

It is rare that we discuss the financial situation of the Rare-earth Information Center, but on occasion it is imperative that we do. The center *was* in a financial crisis about 5 months ago, due to the fact that in the past 2 years we suffered a loss of $10,000 (about 20 percent of our operating expenses) from 10 companies who had supported us in previous years. These companies either significantly decreased their level of support or are no longer supporting us for a variety of reasons.

Our choice, at that time, was to raise additional funds or close the Rare-earth Information Center. We chose the former course, by writing to about 100 companies who were not supporting RIC and by asking our current benefactors to raise the level of their contributions. The response was heart-warming—19 new companies joined our family of RIC benefactors and they were either listed in the December issue or are listed in this issue. In addition, many of our long time benefactors were able to increase their contributions, which we truly appreciate. However, the center is still a few thousand dollars short of making up this deficit. We hope that those companies we have written and who have not yet responded will do so in the near future (our fiscal year ends in about 4 months), and that those benefactors who normally contribute in the second half of our fiscal year will continue to support us in a positive manner. *Finally, we would like to hear from any company or individual, whom we did not contact, but is in a position to support the Rare-earth Information Center.* Please address your inquiry by letter or telephone to the editor and director (the address and phone number are listed in our mailing block on page 5).

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

2nd Intl. Conf. on the Basic and Applied Chemistry of the *f*-Transition (Lanthanide and Actinide) and Related Elements (2nd I.C.L.A.)
Lisbon, Portugal
September 1-5, 1986
RIC News XIX [4] 4 (1984)

*New Listing

ACS AWARD

NUCLEAR CHEMISTRY

Gregory R. Choppin has received the 1984 American Chemical Society citation for achievement in nuclear chemistry. Professor Choppin is R. O. Lawton Distinguished Professor of Chemistry at Florida State University, Tallahassee, and active in many areas. He was recognized for his work on the nuclear chemistry and radiochemistry of the 4*f* and 5*f*-transition elements, particularly the actinides. Some of his recent investigations are especially relevant in assessing the behavior of actinides and lanthanides in the environment. He developed rapid separation techniques for the lanthanides and actinides used in the study of nuclear fission reactions and studied the complexation and thermodynamic properties of the individual elements.

4th Spedding Award Nominations Open

This is a special award given in recognition of distinguished contributions in the field of rare earth science and/or technology. It is even more special this time since it will be the first awarded since the death of Frank H. Spedding in 1984 and will be awarded in the city of his birth. The award will be made in connection with the 17th Rare Earth Research Conference in June of 1986.

Nominations are now being sought from the world-wide rare earth community for consideration by the awards committee. An individual can present more than one candidate for the award. Seconding letters are encouraged, particularly if they present significant information not covered by the nominator.

Forms for use in making nominations can be obtained from Professor G. R. Choppin, executive secretary, Frank H. Spedding Award Committee, Department of Chemistry, Florida State University, Tallahassee, Florida 32306, U.S.A. [Telephone: (904) 644-3875]. Nomination forms, including seconding letters and other supporting documents, must be in the hands of the executive secretary by October 1, 1985.

17th Rare Earth Research Conference

The 17th Rare Earth Research Conference is scheduled for June 8-12, 1986 at McMaster University, Hamilton, Ontario, Canada. Hamilton, the birthplace of Frank H. Spedding, is located about 60 km from both Toronto and Niagara Falls.

The program will include the following topics: general and analytical chemistry, solutions and solvation, biochemistry, organometallic chemistry, geochemistry, spectroscopy, metallurgy, crystal growth, intermetallic compounds, phase studies and diagrams, solid state physics, x-ray diffraction, neutron scattering, magnetism, thermal and transport properties, surface and interface phenomena, rare earth technology, industrial processes and applications.

The conference program will be structured about several organized symposia that will highlight important current trends in rare earth research and technology and will include both invited and contributed papers. Every effort will be made to continue the strong interdisciplinary and international character of this unique conference.

The fourth Frank H. Spedding Award for excellence in research and leadership in rare earth science and technology will be bestowed at this meeting. For information on nominating a person for this award see story on page 2 of this issue of the *RIC News*.

To assist the program committee, please complete and return before July 1, 1985, the preliminary information form provided below.

(detach)

17th Rare Earth Research Conference

McMaster University June 8-12, 1986

Please complete the following and send before July 1, 1985 to:

Professor J. E. Greedan
Institute for Materials Research
and Department of Chemistry
McMaster University
Hamilton, Ontario L8S 4M1, Canada

This form is for information only and carries no final commitment.

Plan to attend ☐ Yes ☐ No Plan to present paper ☐ Yes ☐ No

Spouse attending ☐ Yes ☐ No Total no. in your party

Special interest area(s). _____

_____

Suggested Symposium Topic(s). _____

_____

Name _____

Address _____

_____

_____

Previous RE Conference Proceedings†

Proceedings of the 12th Rare Earth Research Conference, Vail, Colorado, July 18-22, 1976. Available from University Microfilm, 300 N. Zeeb Rd., Ann Arbor, MI 48106. LD-000328. $83.00*

Conference on Rare Earths and Actinides, University of Durham, Durham City, England, July 4-6, 1977. *Institute of Physics Conference Series Number 37*, W. D. Corner and B. K. Tanner, eds., Institute of Physics, London (1978). 22.00.

Thirteenth Rare Earth Research Conference, Oglebay Park, West Virginia, October 16-19, 1977. *The Rare Earths in Modern Science and Technology*, G. J. McCarthy and J. J. Rhyne, eds. Plenum Publishing Corp., New York (1978). $49.50.

French International Rare Earth Conference, September 4-7, 1978, St. Pierre-de-Chartreuse, France. *Physics of Metallic Rare Earths, J. Phys. (Paris) Colloque C-5* **40**, C5-1-404 (1979). 245 F.

Fourteenth Rare Earth Research Conference, Fargo, North Dakota, June 25-28, 1979. *The Rare Earths in Modern Science and Technology, Vol. 2*, G. J. McCarthy, J. J. Rhyne and H. B. Silber, eds., Plenum Publishing Corp., New York (1980). $59.50.

Symposium at the Second Chemical Congress of the North American Continent (180th ACS National Meeting), Las Vegas, Nevada, August 25-26, 1980. *Industrial Applications of Rare Earth Elements*, (ACS Symposium Series 164), K. A. Gschneidner, Jr., ed., American Chemical Society, Washington, D.C. (1981). $35.00.

Proceedings of the Fifth International Workshop on Rare Earth-Cobalt Permanent Magnets and Their Applications, Roanoke, Virginia, June 7-10, 1981, Karl Strnat, ed. Available from the University of Dayton, Magnetics Laboratory (KL-365), Dayton, Ohio 45469, (1981). $35.00 plus postage.

Fifteenth Rare Earth Research Conference, Rolla, Missouri, June 15-18, 1981. *The Rare Earths in Modern Science and Technology*, Vol. 3, G. J. McCarthy, J. J. Rhyne, and H. B. Silber, eds., Plenum Publishing Corp., New York (1982). $59.50.

Fourth European Conference on the Physics of the Rare Earths and Actinides, Durham, England, March 28-31, 1982. *Journal of Magnetism and Magnetic Materials*, Volume **29**, B. K. Tanner and S. R. Hoon, eds., North-Holland Publishing, Amsterdam (1982). 260 Dutch guilders (~$105.00).

Proceedings of the Sixth International Workshop on Rare Earth-Cobalt Permanent Magnets and Their Applications and Third International Symposium on Magnetic Anistropy and Coercivity in Rare Earth-Transition Metal Alloys, Baden, Austria, Aug. 31-Sept. 3, 1982, Josef Fidler, ed. Available from the Technical University of Vienna, Institute for Applied Physics, Karlsplatz 13, A-1040 Vienna, Austria, (1982). $40.00 plus postage.

Proceedings of the International Conference on Magnetism of Rare-Earths and Actinides, Buharest, Romania, September 1-4, 1983. E. Burzo and M. Rogalski, eds. Available from Central Institute of Physics, Information and Documentation Office, Bucharest POB5206, Romania (1983). Price unknown.

Proceedings of the Seventh International Workshop on Rare Earth-Cobalt Permanent Magnets and Their Applications, Beijing, People's Republic of China, September 16-18, 1983. X-S. Pan, W-W. Ho and C-Z. Yu, eds. Available from Export Department, China National Publications, Import and Export Corporation, 137 Chaonei Dajie, Beijing, People's Republic of China. (1983) U.S.$39.00 Surface Mail and U.S.$50.00 Airmail.

Sixteenth Rare Earth Research Conference, Tallahassee, Florida, April 18-21, 1983. *Journal of Less-Common Metals*, Volumes **93** and **94**. J. J. Rhyne, H. B. Silber, and G. J. McCarthy, eds. Elsevier Sequoia S.A., Lausanne, Switzerland (1983). 400 Swiss francs.

†Published since 1976. For information on earlier conferences see *RIC News* **XVIII** (3) 4 (1983) or contact RIC.
*Note: Prices may change from those quoted here.

CONTRIBUTORS

The third quarter of our fiscal year is usually slow and it is true we only had 6 sponsors renew their support. Our efforts to broaden our base of support, however, produced 10 new members in our family of contributors. The 16 companies giving support during the third quarter are listed below and bring our number of sponsors for the year to 52. The number of years the sponsor has given support to the center is given in parentheses.

Colt Industries, Crucible Magnetics, Division, U.S.A. (11)
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GTE Laboratories, Incorporated U.S.A. (13)
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GMELIN HANDBOOK

The latest two volumes of the *Gmelin Handbook of Inorganic Chemistry* from system 39 to be reviewed are **A7** (247 pages) and **A8** (413 pages). Published in 1984, the cost of the two volumes are DM753(~U.S. $230) and DM1291 (~U.S. $425), respectively. Information on the *Gmelin Handbooks* may be obtained from Springer-Verlag, 4005 Marketing Gmelin, Heidelberger Platz 3, D-1000 Berlin 33, West Germany.

Volume **A7** treats the rare earth minerals, with the exception of the silicates. The minerals are classified according to their anions. Occurrence and paragenesis, chemistry, crystal forms and structures, as well as physical properties and chemical behavior of each mineral are described. For some minerals described in other volumes, only references to those volumes are given. The section on the carbonate minerals takes up about two-thirds of the book.

The first 278 pages of volume **A8** describe the rare earth silicate minerals in the same manner **A7** does for the other types of minerals. This volume also ends with a mineral index, including antiquated or inappropriate names, listing the page number(s) in **A7** or **A8** where the description can be found.

Chapter 11 of **A8** describes rare earth deposits, with a small section devoted to the uses, production, and prices of rare earth ores and compounds. It also contains a few suggestions on prospecting for rare earth deposits. The deposits are treated in a general manner and then on a regional basis. The general discussion is on the genetic types of rare earth mineralization and on the geochemical and geological conditions of their formation and the formation of the deposits. A list of the different types of rare earth ore deposits and their locations are given. In the regional discussions of the deposits in each country or area, only the more important deposits from the past or present and those that are of possible value in the future are discussed.

Garnets

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films. The last paper reviews the history, physical properties, preparations, and applications of monocrystalline cathodoluminescent garnet films.

Business News

Rhone-Poulenc

Peter J. Mallette has been appointed to the newly-created position of Pacific Region sales representative for the Special Products Division of Rhone-Poulenc, Inc. of Monmouth Junction, New Jersey. Peter joined the company in 1981 as a commercial development specialist. The Special Products Division produces and markets rare earths and aluminas.

Legvold

(Continued from page 1)

the rest of his life as part of the university and the Ames Laboratory. He earned his Ph.D. degree in physics and a rank of associate professor in 1946. He was promoted to full professor in 1956. Dr. Legvold was author of over 110 papers, 27 of which he coauthored with Dr. Frank Spedding.

Luther College bestowed an Honorary Doctor of Science degree upon Dr. Legvold in 1975. Iowa State University awarded him the title of Distinguished Professor of Sciences and Humanities in 1977 and named him Professor Emeritus in 1979. He was a corecipient of the 1983 Frank H. Spedding Award, which was presented at the 16th Rare Earth Research Conference. The Spedding Award is given to honor people whose research or leadership in the rare earth field comes closest to the model set by Dr. Spedding during his career of 50 plus years. Dr. Legvold was a Fellow of the American Physical Society and a Distinguished Fellow of the Iowa Academy of Sciences.

Legvold's international reputation for research on rare earth metals was matched by his fame as a witty talented teacher. As a basis for his natural rapport with students, he once said, "I am interested in people and ideas, in that order." He extended his interest in people to the young by always being available to demonstrate to youth groups the physical attributes of low temperatures, magnetism, and other mysterious phenomena. With a few simple props, some liquid nitrogen and oxygen, and his natural gift for the theatrical, he could enthrall almost any audience.

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Spedding

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chemist of exceptional promise under the age of 31. Spedding in 1933 was the third and last winner of the award, joining Linus Pauling and Oscar Rice as the only winners of the Langmuir Prize. After Spedding won the prize a new award, the Award in Pure Chemistry, was established for chemists under the age of 35.

Dr. Spedding studied in England for a year with R. W. Tolman and Leonard Jones at Cambridge on a Guggenheim Fellowship. He returned to the United States and did research in spectroscopy at Cornell University, Ithaca, New York, for two years with a John Bauer Fellowship. While there, he worked with Hans Bethe and Harvey Diehl.

In 1937 Dr. Spedding learned of a job opening at Ohio State University, but when he arrived the job was filled; however, they told him of an opening farther west at Iowa State College, in Ames, Iowa. He has been quoted as saying, "I wouldn't normally have chosen the place, but I was desperate. I thought, I can go there and build up physical chemistry, and when jobs really open up I can go to another school." He did indeed build up physical chemistry *but he never left.*

In 1941 Dr. Spedding received a call from Arthur Compton who was looking for an inorganic chemist that knew something about the chemistry of the rare earths and hopefully uranium, thought then to be closely related. Spedding eagerly joined the secret project first funded under the National Defense Research Council and later known as the Manhattan Project. He successfully organized and led a chemistry and metallurgy research program at Iowa State College and the University of Chicago. The result of this program was the uranium metal that was used in the world's first man-made atomic reactor assembled in 1942 by Enrico Fermi under the west stands of Stagg Field at the University of Chicago. Dr. Spedding was one of the historic group that witnessed the start-up and operation of the first atomic pile. During the next three years, Spedding and his coworkers, under a curtain of strictest secrecy, produced 2,000,000 pounds of uranium in a temporary wooden building.

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In 1947, the Atomic Energy Commission set up a National Laboratory at Iowa State College, later Iowa State University, with Frank H. Spedding as the director. He served in this capacity until 1968 when he retired as director and went back to research. Under his leadership, the laboratory pioneered in the separation and purification of the rare earths by both ion exchange and solvent extraction. Many of the processes used in industry today were developed here at the Ames Laboratory. Dr. Spedding and his coworkers have been largely responsible for developing analytical methods for determining the rare earth purities; developing processes for reducing the salts to metals; and measuring many of the magnetic, electrical, crystallographic, and thermodynamic properties and physical constants of many of the rare earths, their compounds, and alloys. Dr. Spedding had an intense interest in electrolytic behavior of ions in solution. He was involved in measuring the transference numbers, viscosity, conductance, and other properties of aqueous solutions of the various salts of the rare earths. Dr. Spedding was author or coauthor of 260 papers and held 22 patents. His leadership and advice were responsible for many more papers that did not bear his name.

Among the more than 50 honors and awards he received, he was proudest of the Langmuir Prize. Other honors included being selected as a member of the National Academy of Sciences in 1952 and being given the State of Iowa Distinguished Citizen Award in 1961. Among the medals he was awarded are the following: the William H. Nichols Award in 1952 for pioneering work in the chemistry and production of pure rare earth and actinide metals by the New York Section of the American Chemical Society; the James Douglas Award in 1961 for achievement in nonferrous metallurgy by the American Institute of Mining, Metallurgical and Petroleum Engineering; the Midwest Award of the St. Louis Section of the American Chemical Society in 1967 for meritorious contributions in chemistry; the Francis J. Clamer Award in 1969 for achievements in metallurgy for the preparation of uranium, thorium, and the rare earths by the Franklin Institute of Pennsylvania; and in 1975, the Iowa Academy of Sciences Distinguished Fellow Award.

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Iowa State University named him its first Distinguished Professor of Sciences and Humanities and later made him Emeritus Professor of chemistry, materials science and engineering, and physics. The Research Building, a part of the Ames Laboratory, was renamed Spedding Hall in 1974.

The Rare Earth Research Conference (RERC) Corporation established the Frank H. Spedding Award in 1979. The fourth award will be given in 1986 at the 17th RERC in Hamilton, Ontario, Canada, Spedding's birthplace.

Legvold

(Continued from page 5)

Sam Legvold expressed his philosophy of life with the thought, "As long as you have ideas that excite you, it keeps things fun. I've gotten paid for having fun. Isn't that great!" He was one of the most exciting and fun people anyone could ever hope to be around. He will be greatly missed.

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