



Rare-earth Information Center

NEWS

Center for Rare Earths and Magnetics
Ames Laboratory
Institute for Physical Research and Technology
Iowa State University, Ames, Iowa 50011-3020 U.S.A.

Volume XXXIII

March 1, 1998

No. 1

Search of the Month

The sample search below satisfies a request for information on La-Ni and MM-Ni alloys and their hydrogen storage capacities and use in batteries since 1994.

The search utilizes the Boolean operand system with "+" = (or), "*" = (and), and "**A" = (and not). Many more citations would have been referenced had we included more hydrogen storage compound/alloys and searched for papers published earlier than 1994.

(H-STORAGE + BATTERY + ELECTRODE + CURRENT-DENSIT + POTENTIAL + CHARGE-DECHAR + DISCHAR-CAP + APPLICATION) * (LANI5 + LANI5H6 + LANI5H + (LA, H, NI) + (LA, NI) + (MM, NI) + (MM, H, NI) + MMNI5) * (1994 + 1995 + 1996 + 1997)

TERM	KEYWORDS INDEXED	NUMBER IN REQUESTS
H-STORAGE	345	29
BATTERY	138	11
ELECTRODE	533	22
CURRENT-DENSIT	371	1
POTENTIAL	194	2
CHARGE-DECHAR	34	3
DISCHAR-CAP	50	6
APPLICATION	4505	4
LANI5	842	36
LANI5H6	34	4
LANI5H	25	1
(LA, H, NI)	124	8
(LA, NI)	179	23
(MM, NI)	13	3
(MM, H, NI)	7	3
MMNI5	77	7
1994	2994	11
1995	3474	14
1996	3020	10
1997	1982	11
46 DOCUMENTS HAVE SATISFIED THIS REQUEST		

The above Literature Search Report shows the key words used in the search, the number of times each appears in the data base, and that 46 documents since 1994 that contain information on La-Ni and MM-Ni alloys and their hydrogen storage capacities and use in batteries were referenced in the search. More papers can be referenced by specifically requesting the chemical formula of other hydrogen storage alloys.

The cost to receive the Literature Search List from this search, which is a complete listing of all 46 referenced documents, is available for US\$95.00. Supporters can receive as many searches as needed for US\$300.00 per year (corporate) or US\$100.00 (individual).

As an added benefit, supporters receive the 2-page monthly newsletter *RIC Insight* which reports on the late-breaking news of rare earths and how these developments may impact the rare earth industry.

If you would like us to conduct a search for you, please send us your request: RIC, 112 Wilhelm Hall, Ames Laboratory, Iowa State University, Ames, IA 50011-3020 USA; Tel: 515 294 5405; Fax: 515 294 3709; ric@ameslab.gov. ▲

Rare Earth Fertilizer Production

The June 12, 1997 issue of *China Nonferrous Metals News* reported that 40 new rare earth ammonium carbonate fertilizer plants in China were recently brought on-line. The total number of facilities that are producing these fertilizers for agricultural use now number 160 [*Rare Metals*, 16, [3] 238 (1997)]. The 160 plants in China are producing a total of 5 million tons of rare earth ammonium carbonate fertilizer which supplies the agricultural requirements of 16.5 million acres (6.68 million hectares) of farmland. ▲

Norman C. Koon (1939-1998)

Norman C. Koon, physicist at the Naval Research Laboratory, Washington, DC, died in a ski accident in January. A native of Arkansas, he earned his undergraduate and doctorate degrees in physics at Georgia Institute of Technology and then went on to spend his career at the Naval Research Laboratory where he conducted basic research. His specialty was magnetism and rare earth intermetallic compounds. His most recent work dealt with Tb-Fe layered films but he may be best remembered for his early work which ultimately led other researchers to perfect and produce the most important hard permanent magnet materials ever developed, the Nd-Fe-B alloys. Other contributions include thermal expansion measurements, magnetostriction of mixed valence and Kondo systems, spin dynamics of rare earth intermetallics, and crystal field effects in rare earth iron Laves phase compounds. ▲

17th

The Seventeenth Annual Conference on Properties and Applications of Magnetic Materials will be held May 11-13, 1998 in Chicago, Illinois, USA. The conference will bring together engineers and scientists with users and suppliers of magnetic materials. Researchers from Industry and academia will discuss recent developments and project future requirements.

The conference will consist of four sessions, each lasting one-half day: Sensor materials, Trends in motor design, Recent progress in lamination steels, and Instrumentation and measurements. New and important progress that has been made in several areas related to magnetic materials will be covered, such as: quality control for the manufacture of magnetic materials and for nondestructive evaluation, magnetic sensors, materials' properties and processing, innovative magnetic materials for technological applications, and electrical machine design and construction of magnetic devices.

For more information, contact: Bonnie Dow, Department of Electrical & Computer Engineering, Illinois Institute of Technology, Chicago, IL 60616-3793 USA; Tel: 312 567 6809; Fax: 312 567 8976. ▲

MML/EMRS 1998 Symposium

The 3rd International Symposium on Metallic Multilayers (MML'98) will take place June 14-19, 1998 in Vancouver, British Columbia. The symposium will be held jointly with the EMRS Symposium on Magnetic Ultrathin Films and Ultrathin Film Nanostructures.

The conference categories will include topics on thin film growth processes, electronic properties of layered structures, mesoscopic systems (nanotubes, nano-wires, dots, nano-particles and other patterned nano-structures), advanced methods for structural and magnetic characterization, mechanical properties of nanostructured materials, giant magnetoresistance and spin values, spin-polarized tunneling, devices and applications of multilayered

Continued on page 3, Column 1

Conference Calendar

* A NEWS STORY THIS ISSUE

Note: Reach as many potential conference attendees as possible! Send us your conference announcement and we will publish it here. ▲

March '98

The 15th International Seminar & Exhibit on Primary & Secondary Batteries

Fort Lauderdale, Florida, USA

March 2-5, 1998

RIC News XXXII, [4], 3 (1997)

May '98

Seventeenth Annual Conference on Properties and Applications of Magnetic Materials

Chicago, Illinois, USA

May 11-13, 1998

*This issue

28^{èmes} Journées des Actinides

Uppsala, Sweden

May 14-18, 1998

RIC News XXXII, [4], 3 (1997)

June '98

3rd International Symposium on Metallic Multilayers (MML/EMRS 1998 Symposium)

Vancouver, British Columbia, Canada

June 14-19, 1998

*This issue

July '98

Strongly Correlated Electron Systems (SCES98)

Paris, France

July 15-18, 1998

RIC News XXXII, [4], 3 (1997)

August '98

6th International Symposium on Magnetic Bearings

Cambridge, Massachusetts, USA

August 5-7, 1998

The 1998 Magnetic Recording Conference (TMRC'98)

Boulder, Colorado, USA

August 17-19, 1998

*This issue (p. 3, Column 2)

15th International Workshop on Rare-Earth Permanent Magnets and Their Applications

Dresden, Germany

August 30-September 3, 1998

RIC News XXXII, [1] 5 (1997)

*Also this issue (p. 3, Column 1)

September '98

Tenth International Symposium on Magnetic Anisotropy and Coercivity in Rare-Earth Transition Metal Alloys

Dresden, Germany

September 4, 1998

RIC News XXXII, [1] 5 (1997)

*Also this issue (p. 3, Column 1)

7th European Magnetic Materials & Applications Conference (EMMA'98)

Zaragoza, Spain

September 9-12, 1998

RIC News XXXII, [1] 5 (1997)

October '98

RE Beijing '98

Beijing, China

October 2-8, 1998

*This issue, see center section announcement

Formerly International Forum on Rare Earths: Technology and Trade

RIC News XXXII, [2] 4 (1997)

Rare Earths '98

Freemantle, Western Australia, Australia

October 25-30, 1998

RIC News XXXII [2] 5 (1997)

15th Workshop and Tenth

Symposium

The 15th international Workshop on Rare-Earth Magnets and Their Applications will be held August 30-September 3, 1998, and the Tenth International Symposium on Magnetic Anisotropy and Coercivity in Rare-Earth Transition Metal Alloys will be held September 4, 1998, in Dresden, Germany (*RIC News*, XXXII, [1] 5 (1997)).

Invited papers for the Workshop include: "Hydrogen assisted processing of rare-earth permanent magnets", "Rare-earth permanent magnets for high temperature applications", "Rare-earth magnets with high energy products", "Static applications of permanent magnets", "Rare-earth permanent magnets in China: production and raw materials", "NdFeB magnets for high-power motors", "Application of rare-earth magnets in high-performance electric machines", and "Development of the rare earth application market". The Symposium will include the following invited papers: "Simulation of magnetization process in real microstructures", "Modelling of nanocrystalline magnets by using the micromagnetic theory", "Micromagnetization simulation of magnetization reversal in hard magnets of various types", and "Determination of magnetic anisotropy from demagnetization curves".

For more information, contact the conference secretariat: Deutsche Gesellschaft für Materialkunde e.V., Anja Mangold, Hamburger Allee 26, D-60486 Frankfurt, Germany; Tel: 49 69 7917 757; Fax: 49 69 7917 733; ma@mail.dgm.mcs.de; www.ifw-dresden.de/remxy.html. ▲

► MML/EMRS 1998

structures, and magnetic properties of ultrathin films and nano-structures.

For more information, contact: MML/EMRS 1998 Symposium, Simon Fraser University, Conference Services, Halpern Centre, 8888 University Drive, Burnaby, BC V5A 1S6, Canada; technical questions can be addressed to Bretislav Heinrich, Tel: 604 291 4402; Fax: 604 291 3592; bheinric@sfu.ca. ▲

TMRC '98

The 1998 Magnetic Recording Conference (TMRC'98) will be held August 17-19, 1998 in Boulder, Colorado, USA. The conference will present papers on Inductive heads and writing heads for rigid media, reading heads for rigid media, heads for flexible media, head materials, fabrication, and characterization, head modeling and characterization, and interface issues involving heads and media. For more information, contact Ted Schwarz, Peregrine Recording Technology Corp., 1462 Tamberwood Trail, Woodbury, MN 55125 USA; Tel: 303 661 8652; Fax: 303 673 8406; TedSchwarz@aol.com; TMRC'98 website: www-iist.scu.edu/.

Rare Earths '98

The international rare earths conference *Rare Earths '98* will be held October 25-30, 1998 in Fremantle, Western Australia, Australia [*RIC News*, XXXII [2] 5 (1997)]. The conference aims to live up to its upbeat theme "New Technologies for the 21st Century" including "Radio Lanthanides and Nuclear Medicine Therapy" by featuring basic and multidisciplinary papers on the practice and research on rare earth elements, compounds, and alloys. There will be sessions on rare earth chemistry and coordination chemistry, agricultural applications, mineral characterization, industrial applications and processes, medical applications, spectroscopy and non-linear optics, superconductivity, batteries and hydrogen storage, catalysis, markets and processing, synthesis and properties of novel compounds, magnetic and magneto-optical properties, extraction and separation chemistry, electroluminescence and radio lanthanides in nuclear medicine therapy.

Registration fee for the conference is A\$575.00 which includes all conference sessions, program/abstract book, refreshments, conference dinner, and conference proceedings. Students can attend the conference for A\$225.00 but the proceedings are available for a fee. Don't miss this conference if you plan on being around at least for the start of the new millennium!

Continued in next column ►

Rare Earth Complexes

A three-year Priority Research Program that was supported by the Ministry of Education, Science and Culture of Japan, which dealt with a comprehensive array of rare earth complexes, was completed in 1997. As a result of that research program, *New Development of Studies on Rare Earth Complexes* was published. The 944-page report contains 97 papers that review the behavior and synthesis of rare earth complex compounds.

A wide selection of topics of experimentation with rare earth complexes are reported, including rare earth chemistry, synthesis, molecular and crystal structures, properties, catalytic activities of rare earth complexes and organometallics for organic reactions, RE ions in analysis, and separation processes that use RE complexes. The above topics are arranged in four sections: Fundamentals of rare earth complexes; Rare earth complexes in organic reactions, Bioreactivities of rare earth complexes and clinical analysis using rare earth complexes, and Synthesis of materials and novel separation processes via rare earth complexes.

Some of the papers that will be of interest to readers contain information on electronic states and energy transfer in RE complexes, thermodynamics of rare earth ions in solution, 4f electrons in chemical bonds, oxidation of alkanes with rare earth complexes, and lanthanide triflates as water-tolerant Lewis acids. Still others will be interested in the interaction of rare earth ions with biomembranes, recognition and transformation of biomolecules with rare earth complexes, immunoassay using rare earth complexes, and the determination of genetic information using rare earth complexes. Those in industry may

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To make arrangements to attend the "conference of the century", contact Erica Jago, Rare Earths '98, c/-Materials Institute of Western Australia, P.O. Box 397, Jolimont, Australia 6014; Tel: 61 9 387 9590; Fax: 61 9 383 9639; RE98@miwa.org.au; www.miwa.org.au/TREC98/. ▲

ICGMM'96 Proceedings

The Proceedings to the International Conference on Giant Magnetostrictive Materials-Fundamentals and Application (ICGMM'96) is now available as Vol. 258 of *J. Alloys and Compounds* (1997). The conference was held at the Tokai University Center, Honolulu, Hawaii, USA, November 6-8, 1996. The proceedings contains 33 refereed contributions, including five invited papers which cover rare earth magnetostrictive materials, primarily terbium/dysprosium/iron alloys.

Volume 258 is broken down into 4 chapters that can be classified into: fundamental aspects, material processes, devices, and thin films and design/simulation. Chapter 1 contains four papers which introduce the effects of various alloy compositions on magnetostrictive materials, low temperature oxidation of metal surfaces, hydrogen-induced anisotropy in (Dy-Tb-Fe-Co) alloys, and how vanadium alters the microstructure and magnetic properties of a Tb-Dy-Fe alloy. The next chapter will interest those contemplating manufacturing rare earth magnetostrictive materials. Two TERFENOL experts, J.D. Snodgrass and O.D. McMasters, reveal an optimized TERFENOL-D manufacturing process, while other papers report on the crystal growth of Tb-Dy-Fe alloys and the magnetic properties and thermal stability of PrFe₂. The third chapter contains the most papers (15) and may be the most interesting to the neophyte as it covers how TERFENOL can be employed in actuators, transducers, motors, vibration control devices, fretting machines, torque induction, sonar systems, and others. Many diagrams of apparatus and photographs of devices and working systems are included. Several contributions provide models and simulations for testing and measuring TERFENOL performance. The last chapter deals with the latest and up-to-date discoveries of magnetostrictive thin film technology. Not only are the applications of magnetostrictive thin films explored, but magnetostrictive TbFe/Fe multilayers, and the deposition of laser-ablated and rf magnetron sput-

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HTS Symposia

A four-day symposium on "High Temperature Superconductor Thin Films: Growth Mechanisms - Interfaces - Multilayers" was held during the 1996 Spring Meeting of the European Materials Society. The meeting was held in Strasbourg, France and was primarily focused on the specific topics of growth, interfaces and multilayers of High-T_c materials. As a result, the symposium covers problems associated with substrates, growth and epitaxy induced defects in these materials.

The results of the meeting appear in *J. Alloys and Compounds*, 251, [1-2] (1997) and contains 77 papers (64 of which pertain to rare earth materials) that were presented at the European Materials Research Society 1996 Spring Meeting, Symposium F: High Temperature Conductor Thin Films: Growth Mechanisms - Interfaces - Multilayers. The 380-page volume is arranged according to ten major topics dealing with high temperature superconductors: Substrates/growth/epitaxy induced affects, Ultrathin films/grain boundary formation, Film

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tered thin films are explained. In addition, composition effects and magnetic properties in Tb-Dy-Fe films, as well as magnetostriction in Sm-Fe-B films, are reported.

Among the uses and potential applications of rare earth magnetostrictive materials, ICGMM'96 reminds us of the progress made in the study of micromachines and microelectronics and how these technologies can become advanced using rare earth magnetostrictive materials. The integration of micromachines and microelectronics form the concept of microsystem technology which is sure to be the subject of future research and interest. The success of future microsystems may rely heavily on the results of research on rare earth magnetostrictive thin films.

The cost of the Proceedings to ICGMM'96 is US\$750.00 and it can be ordered from Elsevier Science, P.O. Box 945, New York, NY 10159-0945; Tel: 212 633 3730; Fax: 212 633 3680; usinfo-f@elsevier.com. ▲

growth/oxygen related phenomena/oxygen ordering, Structural defects and transport in HTS thin films, Tunneling barriers/heterostructures/Josephson junctions, Emerging materials/HTS thin film properties, Precursors, Deposition methods, Deposition and film characterization, and Applications.

Although the majority of the rare earth-superconductor material papers deal with Yb-Ba-Cu-O (YBCO) compounds, there are other materials and topics that the attendees dealt with, such as: SrLaGaO₃-SrLaAlO₃ solid solutions as substrates, molecular beam epitaxy grown La₂CuO₄ thin films on various substrates, and the use of CeO₂ in heteroepitaxial films grown by metalorganic vapor phase deposition. YBa₂Cu₃O₇ still receives its share of attention by reports on sputtering processes for smooth surface YBCO film deposition, optical and photoacoustic studies, surface resistance and deposition temperature, and laser ablation studies.

The use of organic precursors for preparing mixed-oxide superconductor materials is attracting increasing attention. Several papers deal with this technology and how it applies to chemical vapor phase deposition. The deposition kinetics of YBCO from 2,2,6,6-tetramethyl-3,5-heptanedione (thd) precursors from a single source and the various precursors used in YBCO deposition for use in a specific manufacturing environment are discussed.

The researchers of High-T_c superconductors have remained focused since their experimental designs reflect the proposed end uses and ultimate application for this class of materials, which include resistive fault current limiting devices, magnetic resonance imaging, and cellular communications base stations.

Volume 251 "High Temperature Superconductor Thin Films: Growth Mechanisms - Interfaces - Multilayers" is available for US\$500.00 from the Elsevier Science customer service department nearest you. Customers in Europe should send their orders to: P.O. Box 211, 1000 AE Amsterdam, The Netherlands; Tel:31 20 485 3757;

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Edge Technologies

"Expands"

Edge Technologies, the manufacturer and worldwide distributor of TERFENOL-D[®], is adding a 20,000 square foot manufacturing facility as part of their 5-year expansion plan (*The Des Moines Register*, November 17, 1997, 3B (1997)). The US\$15 million expansion plan calls for a total increase of 80,000 square feet in facilities by 2002 so that the company can meet market demand for its magnetostrictive Dy-Tb-Fe alloy. The floor space of the initial facility was 10,000 square feet but additional room was needed since Edge Technologies, Inc. has experienced a 100 percent annual growth during each of the past five years.

The initial expansion, slated to be complete this year, will triple the production capacity of the company. The additional space will be divided equally among administration, engineering, and production, since all aspects of the operation will be expanded. The company is projecting sales of its TERFENOL materials and products for 1998 to be between US\$5 million and US\$10 million.

The powerful magnetostrictive alloy can be used in advanced flight control systems in aerospace such as those used in missiles and other vehicles where rapid reaction times are necessary. In the near-term, the company will benefit from demands of the U.S. Navy to deploy more advanced sonar systems. The new, powerful, sonar systems will utilize transducers made of TERFENOL-D[®] alloy that will

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➤ *HTS Continued from previous page*
 Fax: 31 20 485 3432; ninfo-f@elsevier.nl; in the Americas: P.O. Box 945, New York, NY 10159-0945 USA; Tel: 1 212 633 3750; Fax: 1 212 633 3780; usinfo-f@elsevier.com; in Japan: 20-12 Yushima 3-chome, Bunkyo-ku, Tokyo 106 Japan; Tel: 81 3 5561 5033; Fax: 81 3 5561 5047; forinfo-fy04035@niftyserve.or.jp; Singapore: No. 1 Temasek Avenue, #17-01 Millenia Tower, Singapore 039192; Tel: 65 434 3727; Fax: 65 337 2230; asiainfo@elsevier.com.sg. ▲

Thin Film Photonic Materials

The Er³⁺ ion, with its intra-4f emission at 1.54; a standard telecommunications wavelength, is well suited for its application in thin film integrated optoelectronic (photonic) technology. The increased bandwidth that is available using optical communications technologies enables data information transfer at rates that are orders of magnitude higher than what is currently available in electronic materials. In the near future, Er-doped Si light emitting diodes (LEDs) could be used in Si-based optoelectronic circuits.

A review by A. Polman, FOM-Institute for Atomic and Molecular Physics, Kruislaan 407, 1098 SJ Amsterdam, The Netherlands; polman@amolf.nl; <http://www.amolf.nl>, (*J. Appl. Phys.*, **82**, [1] 1-39 (1997)) describes the synthesis, characterization, and application of several different Er-doped thin film photonic materials. The article focuses on oxide glasses, ceramic thin films, and amorphous and crystalline silicon, all doped with Er by ion implantation. The ox-

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eventually replace conventional piezoelectric ceramics that are currently used. The sonar related business alone could earn the company between US\$20 million and US\$50 million in 2002.

TERFENOL-D[®] Clamps

ETREMA Products, a subsidiary of Edge Technologies, is now offering wirebonding clamps made from TERFENOL-D[®] (*J. Metals*, **49**, [12], 12 (1997)). The clamps are suitable for sub 90 ms wire cycles that approach 20 wires/second bond capability. The clamp weighs less than 20 g but has a clamping force greater than 100 g while having an opening displacement of 140 μ m. The clamp uses less than 5 watts of power and has a response time of less than 2.5 ms. For more information, contact the company at: 2500 North Loop Drive, Ames, IA 50010 USA; Tel: 515 296 8030; Fax: 515 296 7168. ▲

Barry's New E-mail

Barry Kilbourn, Molycorp's Mr. Rare Earth, has a new e-mail address. He can now be contacted at: mcmpbtk@mpmoly.unocal.com. ▲

de glasses that are doped with Er³⁺ and covered in the review include pure SiO₂, phosphosilicate, borosilicate, and soda-lime glasses.

In the section on silica glasses, the utility of Er³⁺ in pure silica is explained including the optical activation of Er, and Er³⁺ as a probe for irradiation damage. Other silica glasses are covered as well with upconversion and optical gain estimates and spontaneous emissions near a dielectric interface. Optical activation, upconversion, optical mode imaging, and absorption and emission cross sections are included for ceramic thin films Al₂O₃ and Y₂O₃, while Er-doped LiNbO₃ contains information on not only optical activation, but also amorphization and recrystallization.

A section dealing with erbium incorporation in crystalline and amorphous silicon, including solid phase crystallization and segregation, impurity effects, and ion beam induced epitaxial recrystallization will interest those involved with Er-Si materials. Optical activation in Si and codoping with explanations on photoluminescence spectra, Er ion concentration in cubic zirconia-Si, and Er ion excitation, quantum efficiency and luminescence quenching are included. Electroluminescence in both Er-doped crystalline and amorphous Si are covered as well.

The author explains that Er-doping by MeV ion implantation is an ideally suited technique since the ion has the typical micron dimensions of optical materials. The role of implantation defects, effects of annealing and concentration dependence are discussed in the review and compared for the various materials.

As optical technologies become more and more important in areas that have previously been the domain of electronics, the role of erbium in photonic materials will certainly increase. ▲

Low Oxygen Metals

Stanford Materials Company has developed low oxygen metals for use in advanced materials. The company offers yttrium metal with oxygen content <0.15%, Terbium O content <0.025%, and Dysprosium O content less than 0.035%. For more information contact James Chen, Stanford Materials Company, 120 West Third Avenue, Suite 1110, San Mateo, CA 94402-1502; Tel: 650 348 3482; Fax: 650 348 4263; info@stanfordmaterials.com; www.stanfordmaterials.com. ▲

Help Wanted

Qi Long Enterprise (USA) Inc., a fully owned subsidiary of a major rare earth manufacturer, is looking for an experienced sales agent and distributor of high quality rare earth oxides, hydroxides, fluorides, and metals. The company will provide attractive commission and terms. If interested, contact the company at: 3301 Ocean Park Blvd., #108, Santa Monica, CA 90405 USA; Tel: 310 314 2291; Fax: 310 314 9935; qilong@gus.net; www.qi-long.com. ▲

R-P Creates Rhodia

Rhône-Poulenc's Chemicals and Fibers & Polymers operations have merged into a company with a new name - Rhodia. The new company was established January 1, 1998 when Rhône-Poulenc's 29 enterprises were reorganized into six divisions. The rare earth enterprise is now part of the Services and Specialties Division of the new company and will remain part of the Rhône-Poulenc group. The rare earth products and services that the company formerly provided, such as Actalys®, Eolys®, Neolor®, Cerox®, and Opaline® will be unchanged while facilitating future growth and the development of new products. Rhodia expects total sales in 1998 of US\$7.5 billion (x 10⁹).

Rhodia's world headquarters: 25 quai Paul Doumer, 92408 Courbevoie cedex, France; Tel: 47 86 12 34; Fax: 47 68 19 11; in North America: Rhodia

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Rhône-Poulenc Expands

Rhône-Poulenc has signed an agreement with Baotou Rare Earth Development Zone (BRDZ) and the Westlake American company, to become partners and form Baotou Luxi Rhône Rare Earths Co. Ltd., a joint venture located in Baotou, Inner Mongolia, People's Republic of China. The agreement will result in the establishment of a new production unit to manufacture rare earth alloys and metal hydride powder so as to satisfy the demand for rechargeable batteries. The unit will have a capacity of 500 tons of rare earth alloys and powder per year and is slated to be operational in July of this year.

The new production unit will serve domestic demand for the rapidly expanding high technology markets in China which includes computers and portable telephones. In addition to its investment of US\$1.5 million, Rhône-Poulenc brings its expertise in producing rare earth alloys and powders, along with its experience in rare earth markets, to Baotou.

For more information on Baotou Luxi Rhône Rare Earths Co. Ltd., contact Véronique Bienaymé, Rhône-Poulenc Terras Rares & Gallium, 25 Quai Paul Doumer, 92408 Courbevoie, France; Tel: 33 1 47 68 05 88; Fax: 33 1 47 68 22 99. ▲

New Location!

The sales and customer service office of Molycorp has moved to a new location. Their new address is: Molycorp, Inc., A Unocal Company, P.O. Box 164, 67750 Bailey Road, Mountain Pass, CA 92366 USA; Tel: 760 856 6680 (In the USA: 888 577 7790); Fax: 760 856 6676. However, the company's remittance address remains: Union Oil Company of California, Molycorp, Inc., P.O. Box 651581-MC, Charlotte, NC 28265-1581 USA. ▲

Inc., CN 7500, Prospect Plains Road, Cranbury, NJ 08512-7500; Tel: 609 860 4423; fax: 609 860 4990. The company operates plants located at 6213 Highway 332E, Freeport, TX 77541 USA; Tel: 409 233 7871; Fax: 409 233 4682, and at 8220 West Harrison Street, Phoenix, AZ 85043 USA; Tel: 602 936 1481; Fax: 602 936 3614. ▲

TradeTech, L.L.C.

The offices of TradeTech, L.L.C. have moved to: Dominion Plaza, 600 Seventeenth Street, Suite 720 South, Denver, CO 80202 USA; Tel: 303 573 3530; Fax: 303 573 3531. The company publishes the excellent rare earth-industries newsletter *Elements: Rare Earths, Specialty Metals and Applied Technology*. ▲

New Elements

Elements Rare Earths, Specialty Metals and Applied Technology is one of the rare earth industry's premier publications. Each issue contains valuable information on the recent market developments in rare earths as well as keeping readers apprised of market trends, rare earth pricing, and scientific developments that may impact the rare earth industry. This year, in its seventh year of publication, *Elements* will be published on a monthly basis.

The newsletter will also feature a new format that combines the *Elements Monthly Market Activity (EMMA)* bulletin, which was introduced last year, with each issue. An interesting section of each newsletter is a report on U.S. rare earth imports/exports, and U.S. imports from the People's Republic of China and the Commonwealth of Independent States (CIS).

Elements will be published on the 15th day of each month and distributed to subscribers via fax, e-mail, or regular mail. To subscribe, contact Treva E. Klingbiel, editor, *Elements*, c/o TradeTech, L.L.C., Dominion Plaza, 600 Seventeenth Street, Suite 720 South, Denver, CO 80202 USA; Tel: 303 573 3530; Fax: 303 573 3531; tradetec@ix.netcom.com. ▲

Tianjiao International Inc.

Baotou Steel & Rare Earth Co. (U.S.A.) has changed its name to Tianjiao International Inc. For information on the company's products and services, contact Mr. Weiji Cui, Tianjiao International Inc., 1818 Gilbreth Rd., Suite 223, Burlingame, CA 94010 USA; Tel: 650 259 9618; Fax: 650 259 9608; Baotoure@aol.com; www.baotou.com. ▲

1997 in Review

In 1997, RIC published four eight-page issues of the *RIC News* which were sent to nearly 2,900 readers worldwide each quarter. Additional copies were sent individuals, industry, governments, and universities upon request. Of the current 2,856 *RIC News* subscribers, 965 are from the U.S. and 1,191 are from foreign countries, which makes the free newsletter a truly international publication. Twelve two-page issues of the monthly *RIC Insight* were published and sent to our 138 financial supporters (the *RIC Insight* is sent as a benefit to corporate supporters who contribute at least US\$300.00 per year and individual supporters who contribute at least US\$100.00 per year). Financial supporters are encouraged to utilize our data base services which are available to them free of charge. We also welcome donations from non-supporters in any amount to help pay publishing, printing, and mailing costs.

We answered a total of 560 information requests from industry, universities, individuals, and government from 33 countries on six continents. Over two-thirds of the requests originated from industry, and nearly one-third came from foreign countries. Thirty four U.S. states were represented by the 402 domestic users. A total of 76 IS-RIC publications were distributed free of charge to people who requested them (see "Free RIC Reports" story in next column).

In 1997, we added 7,866 new documents to our data base, bringing the number of documents available to be retrieved by key words and/or authors to 89,250. This represents a growth in our data base of 9.7% and is a record number of new citations that have been added to the RIC data base in one year since RIC began operation over 32 years ago! This exceeds our goal set in 1996 by 4,866 documents! By early next year, our goal is to reach 95,000 documents available to be searched by key words and/or authors. We now have 62,906 authors and 47,145 different key words in the data base to search from. The number of computer-coded references in the RIC data base should exceed 100,000 by 2000. ▲

Free and Cheap!

The Rare-earth Information Center has a limited supply of IS-RIC Reports that are still available free upon request:

IS-RIC-4	"Rare Earth Metals in Steels"
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199800010	HIGUCHI:H KADONO:K KITAMURA:N	TAKAHASHI:M OHTSUKI:T	KAWAMOTO:Y PEYGHAMBARIAN:N
Optical transitions and frequency upconversion emission of Er ³⁺ ions in Ga ₂ S ₃ -GeS ₂ -La ₂ S ₃ glasses			
J. Appl. Phys., 83, [1], 19-27 (1998)	GLASS	UPCONVERSION	EMISSION
1998	(LA,GE,S)	GA ₂ S ₃	GES ₂
ION LA ₂ S ₃	TRANSITION	SPECTROSCOPY	SULFIDE-GLASS
			ER-OPTICAL

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➤ *Continued from page 3*

find the contributions on novel separation processes using RE complexes useful, such as fabrication of high strength ceramics via rare earth complexes in supercritical solvents, preparation of mesoporous activated carbon using rare earth complexes, and a new separation technique for the mutual separation and recovery of rare earths via complex formation.

New Development of Studies on Rare Earth Complexes will be a valuable reference tool to researchers in academia, industry, and government institutions who are interested in the study of rare earth complex compounds. The report is was published in 1997 by the Rare Earth Society of Japan, c/o Department of Applied Chemistry, Faculty of Engineering, Osaka University, Yamadaoka 2-1, Suita, Osaka 565 Japan. ▲

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<i>RIC News</i>	
Vol. XXXIII, No. 1	March 1, 1998
Published quarterly in March, June, September, and December by Rare-earth Information Center a Unit of the Center for Rare Earths and Magnetics, Ames Laboratory, Institute for Physical Research and Technology, Iowa State University, Ames, Iowa 50011-3020	
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