Rare-earth Information Center INSIGHT

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First Viable USA Yttrium Deposit!

Recently Molycorp and the Mescalero Apache Tribe announced a joint leasing-operating agreement to develop a deposit containing yttrium and zirconium. The eudialyte mineral deposit is located in southeastern New Mexico on tribal land. The deposit is known to contain at least 2.7 million tons of recoverable material grading at 0.18% Y_2O_3 and 1.2% ZrO_2. Tests have shown that these oxides can be extracted with conventional heap leaching technology similar to that used in extracting gold and copper.

Recent Developments from Down-Under:

Another High Grade Australian Deposit

A 3.1 million mt deposit of rare earths at Yangibana, 400 km east-northeast of Carnarvon, Western Australia is being evaluated by Western Rare Earth NL and Newmont Australia Ltd. This deposit averages 1.7% rare earth oxides, with some portions as high as 11%. A limited drilling program to upgrade 1 million mt of the proven reserves and an economic feasibility study is planned. Production could begin in 1991 at an eventual 100,000 mt per year rate.

Eneabba West Project

Renison Gold Fields Consolidated recently informed the public that its wholly owned subsidiary AMC Mineral Sands Ltd. will begin to extract the heavy sands from its Eneabba West Project in Western Australia. They will process 20 million mt/yr, producing 180,000 mt ilmenite, 68,000 mt zircon, 41,000 mt rutile, and 2,500 mt monazite yearly. The start-up is scheduled for early 1991 and the deposit is expected to last 13 years at the above production rate.

Port Pirie

SX Holdings Ltd., 51% owned by Muswellbrook Energy and Minerals Ltd., has been drilling and sampling tailings at the site of the former uranium processing plant in Port Pirie, South Australia. The first stage of this project involves the reprocessing of 200,000 mt of uranium tailings for their rare earth contents, which is especially rich in scandium. In-site leaching was to have begun during the last quarter of this year.

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Permanent Magnet Proceedings

The proceedings of the European Materials Research Society (E-MRS) symposium on the properties, processing and applications of rare earth permanent magnets, became available in the USA since the last issue of **RIC Insight**. The proceedings, edited by I. R. Harris, was published in J. **Magn. Magn. Mater. 80** [1], (August 1, 1989). The 134 page issue contained 26 papers (4 invited and 22 contributed). Most papers were authored by European scientists or engineers, with one Japanese and one American paper. The meeting took place in Strasbourg, France on November 8-10, 1988.

A New Practical Y-Ba-Cu-O Superconductor

The $YBa_2Cu_4O_8$ high temperature superconductor (known as the 1:2:4 for its Y:Ba:Cu ratio) has been overlooked since its discovery last year because its superconducting transition temperature was only 80 K. The major advantage of the 1:2:4 over the conventional $YBa_2Cu_3O_{7-x}$ (1:2:3) is that the former is much more stable to the oxygen stoichiometry at high temperatures than the 1:2:3 phase. Recently Miyatake et al. [**Nature, 341**, 41 (September 7, 1989)] reported that by replacing 10% of the yttrium atoms in the 1:2:4 by calcium the superconducting transition temperature can be increased to about 90 K, which makes this material much more attractive as a practical liquid nitrogen (77 K) superconductor. The onset of superconductivity in $Y_{0.9}Ca_{0.1}Ba_2Cu_4O_8$ occurs at 90.9 and zero resistance is attained at 87.4 K. The authors found that neither the undoped or Ca-doped 1:2:4 phase looses oxygen below 800°C, which is about twice as high as the oxygen decomposition temperature of the 1:2:3. Several hurdles need to be overcome if the Ca-doped 1:2:4 is a serious competitor for the 1:2:3 and some of the other well established superconductors. These include: high critical field and critical current values; ease of preparation and fabrication in various forms, e.g. wires, thin films; and lack of reactivity with metals and other ceramic materials.

Thin Film Oxygen Sensors

Advances in developing room temperature oxygen sensors are occurring rapidly. Three months ago we described the use of a LaF_3 single crystal oxygen sensor, and now we report on a recently published paper by some of the same authors on the use of a sputtered LaF_3 film oxygen sensor [Muira, et al., Sensors Actuators **16**, 301 (1989)]. They found that this sensor could detect gaseous oxygen as well as dissolved oxygen in water at room temperature. The LaF_3 film also has better oxygen-sensing properties than the LaF_3 single crystal, especially with quicker response time. Furthermore, the use of a sputtered film instead of a single crystal reduces the cost of fabricating a sensor, but the biggest advantage is that the films can be more readily adapted for microfabrication and sensor integration.

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