# Rare-earth Information Center INSIGHT

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**Sumikin Molycorp, Inc.**

In late January Molycorp, Inc. and Sumitomo Metal Industries Ltd. announced the formation of a joint venture company to develop and market rare earth products in Japan. The new company is called Sumikin Molycorp, Inc. and it holds exclusive rights to distribution and selling Molycorp's lanthanide products in Japan. The new company is expected to produce lanthanide products in Japan based on technology developed and licensed by Molycorp. Sumitomo Metal Industries will hold 67% of Sumikin Molycorp while Molycorp's share is 33%. This joint venture firm is capitalized at $2 million and was officially established in Japan on January 24, 1990.

**A New Permanent Magnet Alloy?**

Scientists at Siemens AG Research Laboratories in Erlangen, West Germany have prepared and measured some of the properties of a new magnetically hard bulk Sm-Fe-Ti phase. The group headed by K. Schnitzke found that an alloy of the $Sm_2Fe_7Ti$ composition has room-temperature coercivities greater than 50 kOe, a Curie temperature of 380°C and a temperature coefficient of coercivity of only 0.28%/K (Appl. Phys. Lett. 56, 587-9, 1990). The coercivity and the Curie temperature of $Sm_2Fe_7Ti$ are higher than that of NdFeB permanent magnet, while the temperature coefficient of coercivity is less, all of which are desirable. Unfortunately, the saturation magnetization is ~7 kG, which is quite low.

The bulk alloy was prepared by mechanically alloying Sm, Fe and Ti powders in a ball mill and then heat treating between 500 and 900°C. Since the magnetically hard material can only be obtained during heat treatment at temperature, the authors believe that it is a metastable phase. The authors also found that this phase could not be prepared by substitution of Ti by V or Mo. When Sm was replaced by Y, Nd, or Pr a magnetically hard phase was not formed. The authors note that the mechanically alloying route is a low-cost and large-scale production technique, and is a nonequilibrium processing tool which can be used to prepare new, and possibly metastable, phases which might have interesting magnetic properties.

**Oil and Gas Estimates Tumble**

New estimates of the oil and gas remaining to be found in the U.S.A. made a few months ago by the U.S. Geological Survey and the U.S. Department

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of Interior's Minerals Management Service have dropped considerably over earlier estimates. The new estimates for undiscovered oil and gas are 35 billion barrels and 363 trillion cubic feet, respectively, which are smaller by a factor of two over the 1981 numbers of 83 and 594, respectively. In the case of oil, the U.S.A. is consuming 5.4 billion barrels per year. Taking into account the known reserves of recoverable oil (51 billion barrels) and the estimated undiscovered oil, the U.S.A. has only a 16 year supply at the current rate of consumption. But since the U.S.A. currently imports 50% of its oil, this stretches the domestic supply to 32 years. The situation with respect to natural gas is somewhat better.

What impact will this have on the rare earth industry, not just the U.S.A., but worldwide? First of all it is obvious, that prices for energy (regardless of its source - coal, oil, gas, nuclear) will rise significantly in the 1990's and the cost of producing rare earth materials will go up proportionately. That is the bad news. The good news, however, is that some segments of the industry will benefit, especially with respect to energy conservation and new energy systems. For example, expect the rare earth permanent magnet market to grow as automobile manufacturers in an effort to increase the gas mileage continue to reduce the weight of their cars by replacing the old magnets with the high strength Nd-Fe-B material. The increased use of structural ceramics, such as yttria-stabilized zirconia, $Si_3N_4$, and sialons to replace metal parts to increase the efficiency of automotive engines will result in an increased demand of $Y_2O_3$.

The use of sensors along with computers to control chemical and metallurgical processes, heating and cooling equipment, etc. to make them run at their highest efficiencies will involve a variety of rare earths in many of these sensors. The phosphor industry, especially those involved in fluorescent lighting, will also benefit from increased energy costs as companies and individuals switch more rapidly to the more efficient types of lighting, most of which contain rare earth phosphors.

The push toward the hydrogen economy will surge forward as energy costs accelerate in the 1990's. This will benefit those companies involved with rare earth metal hydrides in hydrogen storage systems, heating and cooling systems, and pumps.

Just how the escalation of the cost of energy affects an individual rare earth company will of course depend on many things - how energy intensive are their processing procedures, the mix of their products, and the timing of management to make changes as external forces and events impact them.

The editor's estimate is that energy prices will increase by 50% over the 1989 prices by 1995, barring no major worldwide catastrophe.

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