RARE-EARTH INFORMATION CENTER INSIGHT

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W-Ti-RE-Sb '88 Conference Highlights

The First International Conference on the Metallurgy and Materials of Tungsten, Titanium, Rare Earth, Antimony (W-Ti-RE-Sb '88) was held in Changsha (Hunan Province), People's Republic of China on November 6-9, 1988. The first day's talks consisted of ten plenary lectures reviewing the major areas within the central theme of the Conference. The editor of this newsletter gave the only talk which dealt exclusively with the rare earths. It was entitled "Recent Developments in Rare Earth Physical Metallurgy". Two other plenary lectures included some information about the rare earths - one on rare earth deposits in China and the other on depositing high temperature superconductor layers, including $YBa_2Cu_3O_{7-x}$. There were four half day sessions, two poster sessions plus a closing discussion session involving the rare earths. Unfortunately the two oral sessions on the extractive metallurgy were held in parallel with the two oral sessions on the materials science and applications of rare earths.

1:2:3 Superconducting Wire

Prof. Peter Wachter from ETH-Zürich presented an invited talk on his model for high temperature superconductivity in ceramic oxide materials to lead-off the materials science and applications oral sessions. At the end of his presentation he told the audience that he and his co-workers have prepared kilometers of the $YBa_2Cu_3O_{7-x}$ (1:2:3) superconductor in wire form. They prepared the wire by arranging a silver alloy containing the 1:2:3 ceramic in a hexagonal array of 19 "cores" (strands). Then 19 of these arrays are stacked together before the total composite is drawn down to a 361 multistrand wire of an outside diameter of 0.1 mm. The individual strands are about 1 μm in diameter. The current carrying capacity, however, is quite low, 500 A/cm^2. Prof. Wachter claims the wire is superconducting over the full length with no high resistance (non-superconducting) areas along the wire. This is a good start for preparing ceramic superconducting wires for practical applications, but a significant improvement in the current density will be needed if wide spread use of the 1:2:3 wire is to be realized.

Optical Storage Disks

During the discussion session at the end of the Conference it was noted that a new emerging application involving pure rare earth metals appears ready to take off. Prof. Emeritus S. Goto (University of Tokyo) mentioned

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that a number of Japanese firms are involved in the development of rare-earth- (Gd and Tb) transition metal (Fe and Co) amorphous alloys for magneto-optical storage. The advantage of these amorphous alloys is that the stored information can be erased and written over using a laser beam. One of the big markets would be compact disks that individuals can use to record music, television shows, etc. in one's home much the same as is being done today with magnetic tapes (cassettes and VCR's). This would result in a big growth for the metallurgical area of the rare earth field which has been in the doldrums since 1980, and has only started to perk-up in the last few years with the use of Nd in the $Nd_2Fe_{14}B$-base permanent magnets. It appears that a number of Japanese and Chinese rare earth metal producers are gearing up for the new market.

Extractive Metallurgy

Several papers were presented by the Chinese on the separation of the bastnasite and monazite in the Baiyunebo ore by flotation methods. One of the difficulties with the Baiyunebo ore is the occurrence of both the bastnasite (a fluoro-carbonate) and monazite (a phosphate) minerals in the ore body. The present alkaline digestion of the two unseparated minerals has presented some problems, which an efficient, low cost physical separation process could eliminate. From the information presented at the Conference, it appears that some success has been realized.

Electrowinning

A number of papers were presented on the electrowinning of rare earth metals by fused salt electrolysis of their chlorides or fluorides. Because of the extensive use of the metals in the metallurgical field in China (additives to steels and Al, Nd for permanent magnets, etc.) there is a large emphasis on this topic. It is quite possible that as a result of these efforts Chinese technology may surpass that of the Western world (including Japan) in the electrowinning of rare earth metals from fused salts.

Miscellaneous

Based on research results presented in several papers the Chinese appear to be as advanced or ahead of the Western countries and Japan in some areas, e.g. in the technology of rare earth additions to Al and other metals (Cu, Ag and Mo), and in the use of rare earths in agriculture. In comparison there is little or nothing being published on these topics in research and trade journals by scientists and engineers from Australia, Europe, Japan or the U.S.A. If the Chinese scientists and engineers would publish more in English in major peer review journals, we would see a more rapid expansion of rare earth applications and a growth in the industry (both Chinese and non-Chinese) as a result. It is a shame that much of their work is buried in Chinese journals and conference proceedings, both of which have only a limited circulation in the advanced technological countries.

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