

—Equipment and Products—

HIGH-PERFORMANCE MAGNET WITH HIGH FE CONTENT

A. Inoue, K. Masumoto and A. Takeuchi (Japan) have developed a new high-performance magnet having the magnetic product of three times that of Alnico magnet and iron as its major component (90 per cent). In the magnet, nanometer scale iron, iron-neodymium-boron compound and amorphous metal are dispersed uniformly in its tissue. The content ratio area is 90% for iron at atomic base, neodymium 7% at atomic base, and boron 2 to 4% at atomic base.

It is easy to process, and loss is small even when it is made into powder because its structure is of nanometer scale. It is available as isotropic composite magnet. Because it contains 90% iron, the magnetic flux density is as high as 1.3 Tesla, and the maximum energy product is 150 kJ/m³. The coercive force is, however, low at 250 to 280 kA/m.

CARPCO INTRODUCES ITS RARE-EARTH DRUM SEPARATOR

Carpco has introduced its new *MagForce* rare-earth drum magnetic separator. The company claims that it is suitable for high-capacity separation of paramagnetic particles. The air-cooled unit is suited to both laboratory and industrial applications. *MagForce* separators are available with drum sizes of up to 1 m in length, offering a throughput of 10 t/h. By increasing the temperature the unit is said to be capable of processing larger grain particles.

A NEW SUPERCONDUCTING WIRE TO REDUCE LOSSES

Central Research Institute for Electric Power Industry, in co-operation with Furukawa Electric Industry, have developed a new superconducting wire composed of Nd-Ti alloy and Cu-Si alloy, which reduces electric loss to one third that of conventional Ac wire. New superconducting wire employs low-cost Cu-Si alloy as a matrix replacing a high-cost Cu-Ni alloy. The improved processing technique permits manufacture of a 1 km long wire.

A SELF-CLEANING SUSPENDED MAGNETIC SEPARATOR

Industrial Magnetics modified the design of their self-cleaning suspended magnetic separators. Among the improvements are a manganese impact plate on the magnetic face and C-channel construction for take-ups and bearing support. The drive package features a belt drive with speed reducer and lagged pulley drive. The

suspended separators provide continuous tramp metal separation. The units are continuously self-cleaning and they are applicable for in-line above-discharge conveying line pulleys and cross-belt to conveying lines.

10 TESLA WITHOUT LIQUID HELIUM

Toshiba Corporation reported at the 1995 Japan Electrical Engineers Society annual meeting that it had succeeded in generating a magnetic field of 10 Tesla without using liquid helium. The Toshiba's new method does not use liquid helium but employs a small Gifford-MacMahon helium refrigerator which cools the magnet down to below 4.2 K. The system permits generation of 10 Tesla in 10 minutes. Because it does not use any liquid helium, equipment becomes very compact.

40 TESLA HYBRID MAGNET

A 40 Tesla hybrid magnet composed of a large superconducting magnet and a water-cooled magnet has been installed at the Shibasaki area of Tsukuba Science City (Japan). The magnet was constructed to evaluate characteristics of superconductors at high magnetic fields. The refrigerator is composed of a cold box, helium compressor and liquid helium tank. The refrigeration capacity is 450 W at 44 K, or 150 litres in terms of liquefaction capacity (actual capacity is 180 litres). It is necessary for the refrigeration system to operate for four days for cooling the hybrid magnet weighing 17 tonnes.

A NEW HIGH T_c SUPERCONDUCTOR

A new high-temperature superconducting compound $YBa_2Cu_3Se_7$, has been prepared and reported to have $T_c = 371$ K [V.D. Shabetnik et al.: *Tech. Phys. Lett.* **21** (1995), 382]. The superconducting transition temperature of the new compound was increased by starting out with a perovskite material based on the famous $YBa_2Cu_3O_7$ compound, but replacing the oxygen with selenium. The chemical formula of the compound is reported to be $YBa_2Cu_3Se_{7-x}$, where x , the deviation from stoichiometry for Se, varied from 0 to 0.5. The authors believe that their new compound can be classified among those superconductors which exhibit superconducting properties "all the way up to the boiling point of water".