those manufacturing particular organic amines and production catalysts, could improve their product quality by changing their existing gas feed stock from a nitrogen hydrogen mixture, containing 90 per cent hydrogen, to moderately priced pure hydrogen obtained from modern membrane installations. New membranes with ultra-thin noble metal layers could be used for new applications, such as in ammonia synthesis gas production, coal gasification and ferrous metallurgy.

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Platinum in High-Temperature Superconductors

High temperature superconductors have been known about since 1987 when YBaCuO superconductors with critical temperatures above 77 K, the temperature at which nitrogen liquefies, were first synthesised. If such superconductors are to become widely used, however, they will have to be able to achieve high current densities without the superconductivity of the material being destroyed. Thus flux pinning is essential in order to prevent magnetic flux interactions between superconducting regions, otherwise the critical magnetic flux density could be exceeded, destroying the superconductivity and causing Joule heating.

Platinum already finds a variety of applications in high temperature superconductor technology; now researchers at the International Superconductivity Technology Center, Nagoya, Japan have found that additions of platinum or rhodium in certain YBaCuO superconductors can produce a much increased critical current density ("Effects of the Platinum Group Element Addition on Preparation of YBCO Superconductor by Melt Growth Method", M. Yoshida, N. Ogawa, I. Hirabayashi and S. Tanaka, *Physica C*, 1991, **185–189**, (IV), 2409–2410).

It has been reported previously that high critical current densities can be attained in large (123) crystals of $YBa_2Cu_3O_y$ which have fine (211) Y_2BaCuO_5 particles uniformly dispersed throughout them. This dispersion of (211) particles is reported to suppress crack formation, allow the oxygen diffusion rate to increase and also serve as flux pinning centres.

In the current work the microstructure of superconductors containing 0.5 weight per cent platinum group metals, and prepared by a partial melting and slow cooling process, were studied by optical microscopy, while the high critical current density was estimated from magnetisation hysteresis curves. It was found that the addition of platinum or rhodium facilitates the heterogeneous nucleation of the (211) phase; the mechanism for this is discussed. Other platinum group metals had no significant effect, however. For typical platinum-doped melt grown samples, at 77 K and 1 T, critical current densities exceed 18,000 A/cm^2; corresponding values for other samples are less than 10,000 A/cm^2.

Ruthenium Oxide Contacts

If high temperature superconductors,such YBCO, are to be used in electronic or electrical devices it will be necessary to form low resistance contacts with them. This must be achieved without degradation of the superconducting properties and a recent communication from the New York Institute of Superconductivity reports on the sucessful use of conducting metallic ruthenium oxide, RuO_2, as a low resistance contact electrode for YBCO thin films (Q.-X. Jia and W. A. Anderson, *IEEE Trans. Components, Hybrids, Manuf. Technol.*, 1992, **15**, (1), 121–125).

Double-layer contact electrodes of metallic ruthenium oxide overlain with either gold or silver overcame wire bonding problems, and reduced further the contact resistance.