Dispersion Strengthened Gold-Platinum

ADVANCED LABORATORY APPARATUS FOR XRF ANALYSIS

An alloy of 5 per cent gold-platinum has long been used for the preparation of samples for XRF analysis. The simple binary alloy provides a high contact angle with the sample, but grain growth in the mould at high temperatures leads to a gradual deterioration in the quality of sample bead prepared. To overcome this problem Johnson Matthey utilised techniques already employed for the production of dispersion strengthened platinum, and by dispersing 0.08 to 0.1 per cent zirconia in the binary 5 per cent gold-platinum alloy produced a material which dramatically reduced grain growth and the effects of contamination at service temperatures, while retaining the excellent wettability of the alloy.

Additionally, resistance to creep was greatly increased, with a consequential increase in dimensional stability, and results showed that the service life of the mould was significantly longer, in some cases by up to 5 times, and analytical accuracy improved as a result. Such a material is ideal for automatic analytical methods.

The material is designated ZGS 5 per cent gold-platinum, and also finds applications in the production of glass fibre. Its development was described by A. E. Heywood and R. A. Benedek (*Platinum Metals Rev.*, 1982, **26**, (3), 98–104).

In a more recent article ("Oxydation und Schmelzaufschluß in einem Arbeitsgang", *Labor Praxis*, 1983, 7, (5), 416–9), Jean Petin of Esch-Belval-Zentrallabor and Armand Wagner of Laborlux S.A. in Luxembourg describe how Perl'X equipment, originally developed by the French steel industry Research Institute (IRSID), has speeded up the production of beads from metallic and organic samples, and how by precise programming oxidation and decomposition are combined into a single operation.

The machine, which is microprocessor controlled, has six different fusion programmes, and mixing to produce homogeneous beads is achieved by constant agitation in a horizontal axis through the centre of the crucible. Heating of the crucible is by means of a cylindrical coil, and a flat coil heats the casting dish simultaneously. The completed cycle for conventional oxides takes less than 4 minutes.

The authors describe work at their laboratories in which a technique was developed to oxidise metallic samples mixed with alkaline or residual alkaline nitrates in an alkaline melt. The sample is mixed with the nitrate mixture and piled on one side of the crucible. The additional lithium tetraborate is placed on the opposite side. By careful control of heating between 380 and 850°C, the complete oxidation of the sample is ensured before the oxidation medium is exhausted. Heating takes place from the crucible wall and the metal is progressively mixed. At no time is the metal in contact with the crucible wall, and crucible destruction is avoided. The entire process including fusion is completed in less than 10 minutes.

By combining the stages of oxidation and fusion, the Perl'X machine assists in fully automating the process.

Areas of application include the analysis of ferroalloys, hard metals and carbides, oil refinery catalysts, zinc and lead dust and slags, bituminous slate, pyrites, used engine oils, and steel and copper. Other possibilities are also foreseen.

During this work Petin and Wagner observed that the zirconia stabilised gold-platinum alloy is hardly wetted by the melt, so that after pouring the sample a negligible residue remains. Further, it displays dimensional stability and when heated does not recrystallise as quickly as the traditional 5 per cent gold-platinum alloy. This durability results in a longer service life, and between 2000 and 3000 melts per crucible can be obtained. J.D.B.