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Conference Report

INTERNATIONAL CONFERENCE ON HOT ISOSTATIC PRESSING, LULEÅ, SWEDEN (15–16 JUNE 1987)

This conference had over 200 participants from 10 different countries. The 75 papers demonstrated very clearly the rapid development that now characterises the HIP technology.

The mechanisms of hipping were discussed in several lectures with Prof. Ashby from Cambridge giving an authorative introduction. Of particular interest were the papers (e.g., Dr Gueroult from Ecole de Mines, Dr Suh from Kobe and Dr Ramakrishnan from Hyderabad) on the use of Finite Element Method (FEM) techniques in describing the densification process.

In the area of metal powder many examples of hipping of superalloys and intermetallics were given, showing the excellent properties that can now be obtained. Results from large components made in the new press at ASEA Powdermet showed the potential also for relatively large components with more normal compositions but complicated geometries.

Many papers in the well-attended sessions on ceramics dealt with the relationships between process parameters, microstructure and properties. The materials studied ranged from monolithic oxides, borides, nitrides, etc., to complex composites, including whisker reinforced ceramic composites.

Among the many interesting papers on silicon nitride, that of Dr Heinrich (Hoechst CermaTec AG) on production of engine components by HIP of reaction bonded silicon nitride, is particularly worth mentioning. The components made of silicon powder were formed by injection molding, dewaxed, nitrided, encapsulated and post densified by HIP. Very good

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mechanical properties were obtained, especially at high temperature, compared with materials with the same amount of sintering additive (only Y_2O_3) made from silicon nitride powder but not densified by encapsulated HIP. The most important factor is a low content of oxygen present in the silicon precursor which reduces the amount of silica containing glass. This gives less grain growth and excellent creep behaviour at high temperatures.

Other interesting papers on silicon nitride materials densified by HIP without additives were presented by Dr Miyamoto and coworkers. The first of these papers dealt with dense Si_3N_4–SiC whisker composites with 5–30 wt% beta-SiC whiskers fabricated by glass encapsulation. Specimens in which the whisker aspect ratio was 60 had better mechanical properties than those in which the aspect ratio was 200. An increase in the whisker content did not only improve the toughness and flexural strength of the composites but also hardness and thermal conductivity.

Another presentation was on monolithic silicon nitride and it was shown that sintered materials of 99·3% theoretical density could be fabricated by reducing the oxygen content by a pre-firing *in vacuo* in the temperature range 600–1200°C. This material showed no significant degradation in mechanical properties at temperatures up to 1200°C, an indication of very little glassy phase at grain boundaries.

It remains to be said that the organisers had made a splendid job including arranging excellent weather with an abundance of sunshine and very few mosquitos. Initiative will be taken to organise a second conference on the same topic in about two years time, preferably in the USA. The proceedings will appear towards the end of 1987 and can be obtained from Thommy Ekström and Bertil Aronsson.

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