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Foreword

The name of mullite comes from the Island of Mull in Western Scotland, where it was first found in nature. It was in 1924 that Bowen and Greig published their basic work on the occurrence of mullite. Bowen and Greig stated: 'Since this paper was written we have discovered crystals of the 3:2 compound in natural rocks from the Island of Mull. We propose the name mullite to designate the compound in a forthcoming paper of the *Journal of the Washington Academy of Science* where this natural occurrence of the mineral is described.'

Because of its high temperature–low pressure formation conditions, mullite occurs only very rarely in nature. It sometimes is found in high temperature metamorphosed rocks of the sanidinite facies and at the contact of alumina-rich sedimentary rocks with basaltic melts (so-called buchites or sillimanite buchites). Mullite formation was also described in hornfelses (porcellanite) which develop on the contact of bauxite with olivine dolerite intrusions.

In spite of its rareness in natural rocks, mullite is perhaps the most important phase in the field of traditional ceramics. This can be explained by its occurrence as a main constituent in pottery, porcelains, sanitary ceramics, and structural clay products such as building bricks, pipes, tiles, and in refractories. Based on the importance of mullite for technical refractory and ceramic products, in 1956 Robert B. Sosman made a rather poetic statement about mullite in comparing a journey to the Isle of Mull with a pilgrimage. Though our less sentimental generation may have problems seeing things in a similar way, many of us agree with Sosman that mullite is one of the most important ceramic phases.

Beside its value for conventional ceramics, mullite has become a strong candidate material for advanced structural and functional ceramics in recent years. The use of mullite has, e.g. been discussed for high temperature engineering materials, electronic packaging materials, optical materials, porous materials and as a matrix for ceramic composites. The reasons for this development are the outstanding thermo-mechanical properties of mullite:

- Low thermal expansion
- Low thermal conductivity
- Excellent creep resistance
- Good chemical stability
- Oxidation resistance

Congresses and workshops especially dedicated to crystal chemistry, processing, characterization and properties of mullite took place in Tokyo, Japan, in 1987, and in Seattle, USA, in 1990. The international conference in Irsee 1994 was the third to be held on mullite. This workshop brought together basic science researchers with material scientists, and with engineers occupied with the production of technical compounds from all over the world (Fig. 1).

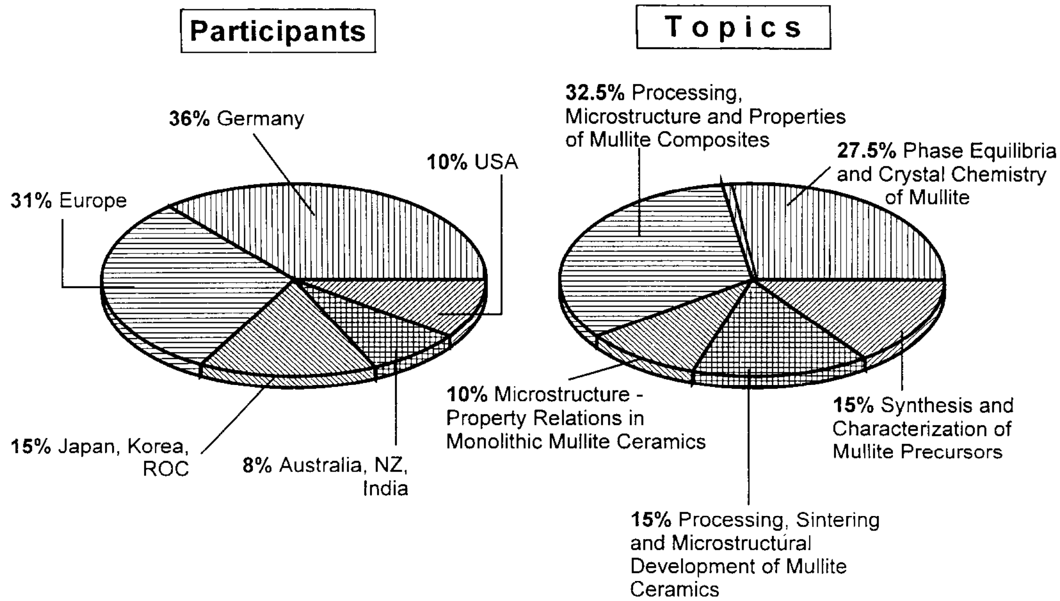

Fig. 1. International Mullite Workshop in Irsee 1994 (Mullite '94). Participants (total number: 52) and topics of scientific sessions.

Topics of the conference were:

- Phase equilibria and crystal chemistry of mullite
- Synthesis and characterization of mullite precursors
- Processing, sintering and microstructural development of mullite ceramics
- Microstructure–property relations in monolithic mullite ceramics
- Processing, microstructure and properties of mullite composites.

The Mullite '94 Workshop provided new, and some most interesting results, which often were discussed late into the night. I believe that most participants will agree that this was a very successful meeting, which was also due to the beautiful environment and the relaxed atmosphere in the old Swabian 'Kloster Irsee'.

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H. Schneider, German Aerospace Research
Establishment (DLR), Institute for Materials
Research, 51147 Köln, Germany