Determination of Sintering Kinetics of Mullite by Differential Dilatometry

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Abstract

Reaction sintering of zircon and alumina is an easy inexpensive route to obtain homogeneous mullite-alumina composites with enhanced mechanical properties. In the present paper we studied the crystallisation behaviour of the zircon and boehmite (as alumina source) mixtures. The powder of boehmite was obtained from partial dehydration of a gibbsite. As-received raw materials were weighed to produce the 3:2 alumina: silica stoichiometric mixture. All raw powders have been ball milling and then isostatically pressed followed by sintering at different temperatures. The non-isothermal activation energies for mullite crystallisation were calculated by the Kissinger method using differential dilatometry. Analysis of the results showed that mullite crystals that bulk nucleation was dominant in mullite crystallisation followed by three-dimensional growth of mullite crystals with polyhedron-like morphology controlled by diffusion from a constant number of nuclei.

References


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