

Fabrication of Powdery Composites Based Alumina and Its Consolidation by Hot Pressing Method in OXY-GON Furnace

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Abstract : In this work, obtaining methods of ultrafine alumina powdery composites and high temperature pressing technology of matrix ceramic composites with different compositions have been discussed. Alumina was obtained by solution combustion synthesis and sol-gel methods. Metal carbides containing powdery composites were obtained by homogenization of finishing powders in nanomills, as well as by their single-step high temperature synthesis. Different types of matrix ceramics composites (α -Al₂O₃-ZrO₂-Y₂O₃, α -Al₂O₃-Y₂O₃-MgO, α -Al₂O₃-SiC-Y₂O₃, α -Al₂O₃-WC-Co-Y₂O₃, α -Al₂O₃-B₄C-Y₂O₃, α -Al₂O₃-B₄C-TiB₂ etc.) were obtained by using OXYGON furnace. Consolidation of powders were carried out at 1550-1750°C (hold time - 1 h, pressure - 50 MPa). Corundum ceramics samples have been obtained and characterized by high hardness and fracture toughness, absence of open porosity, high corrosion resistance. Their density reaches 99.5-99.6% TD. During the work, the following devices have been used: High temperature vacuum furnace OXY-GON Industries Inc (USA), Electronic Scanning Microscopes Nikon Eclipse LV 150, Optical Microscope NMM-800TRF, Planetary mill Pulverisette 7 premium line, Shimadzu Dynamic Ultra Micro Hardness Tester DUH-211S, Analysette 12 Dynasizer.

Keywords : α -alumina, consolidation, phase transformation, powdery composites

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