

Thermal and Mechanical Properties of Powder Injection Molded Alumina Nano-Powder

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Abstract : In this work, the processing steps for producing alumina parts using powder injection molding (PIM) technique and nano-powder were investigated and the thermal conductivity and flexural strength of samples were determined as a function of sintering temperature and holding time. In the first step, the feedstock with 58 vol. % of alumina nano-powder with average particle size of 100nm was prepared using Extrumixing method to obtain appropriate homogeneity. This feedstock was injection molded into the two cavity mold with rectangular shape. After injection molding step, thermal and solvent debinding methods were used for debinding of molded samples and then these debinded samples were sintered in different sintering temperatures and holding times. From the results, it was found that the flexural strength and thermal conductivity of samples increased by increasing sintering temperature and holding time; in sintering temperature of 1600°C and holding time of 5h, the flexural strength and thermal conductivity of sintered samples reached to maximum values of 488MPa and 40.8 W/mK, respectively.

Keywords : alumina nano-powder, thermal conductivity, flexural strength, powder injection molding

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