PREPARATION OF POROUS ALUMINA WITH CONTROLLED PORE SIZE AND POROSITY

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Abstract

Porous ceramics have been applied in a broad range of technological purposes, the increasing number of applications that require porous ceramics have appeared in the last decades, especially for environments where high temperatures, extensive wear and corrosive media are involved. Such applications include for example the filtration of molten metals, high-temperature thermal insulation, support for catalytic reactions, filtration of particulates from diesel engine exhaust gases, and filtration of hot corrosive gases in various industrial processes. The advantages of using porous ceramics in these applications are usually the high melting point, tailored electronic properties, high corrosion, and wear resistance in combination with the features gained by the replacement of solid material by voids in the component. Porous ceramics are produced within a wide range of porosities and pore sizes depending on the application intended. Porosity and pore size distribution can be carefully controlled by the choice of organic composite and the amount added. The objective of this study is to produce ceramic nanostructured of alumina with micrometric pore sizes. There are many methods for obtaining porous ceramics, in general consisting in adding organic particles, which volatilize during the first heat-up, to the ceramic matrix. The challenge encountered in porous materials nowadays is controlling the size, shape, and uniformity of the porous volume. The organic particle used to create the pores was CMC, which particles present respectively fibrous shapes. ZrO_2-Al_2O_3 and organic powder mixtures were compacted and the compacts were sintered at 1600^{o}C. The properties of the porous ceramic samples were carried out considering the porosity, the density and the distribution of pore size.

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