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and
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**"EUROPEAN DOCTORATE IN PHYSICS
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PHYSICS AND CHEMISTRY
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P50. Effect of SiO₂ on the Properties of Porous Corundum-Mullite Ceramic

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Due to its outstanding thermal and mechanical properties, corundum and mullite ceramics without doubt became very important in both the traditional and the advanced ceramic materials applications. The aim of this work is to describe the method of preparation, sintering and finally the properties of obtained corundum/mullite ceramic. The samples of porous corundum/mullite ceramic are prepared from α -Al₂O₃, γ -Al₂O₃ or from α - and γ -alumina mixture in the 1:1 proportion, kaolin or silica. The compositions of prepared samples are as follows. The one samples series with α - or γ -alumina, or its mixture and kaolin (proportions 1:1), another also with corresponding alumina, its mixture and SiO₂ in the proportions of 2.55:1 respectively. The samples series with kaolin are prepared with distilled water, but with SiO₂ are prepared with distilled water and with the addition of 0.2 wt% of 1 % solution of sodium carboxymethylcellulose using slip casting technique. Aluminium powder (0.18 wt%) is used as pore formation agent. The samples are sintered in the 1650°C temperature for an hour [2-4].

Various testing methods such as XRD analysis, optical microscopy, Hg porosimetry and 3 point bending strain test were used to study the properties of the samples. Evaluation of thermal shock resistance of these materials were based on the measurements of Young's modulus using non-destructive sound propagation method [2-5].

Kaolin and α -Al₂O₃ in the initial composition increases bulk density and mechanical strength and changes geometrical size of the sample. SiO₂ and γ -Al₂O₃ on the contrary reduces mechanical properties and decreases shrinkage. Using γ -Al₂O₃ the samples with open porosity of 46 to 56 vol% were acquired. The relative amount of pores depends on the initial composition of type of alumina, kaolin and SiO₂ used.

Keywords: corundum-mullite, kaolin, alumina, α -Al₂O₃, γ -Al₂O₃, porous ceramic.

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