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Edited by

Dr.habil.sc.ing. G.Mezinskis
Dr.habil.chem. G.Sedmale
Dr.sc.ing. J.Sētiņa
Dr.sc.ing. I.Sperberga
Dr.sc.ing. L.Krage
Dr.sc.ing. I.Pavlovska
M.sc.ing. D.Andersone

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D.Andersone, I.Pavlovska, G.Bula, A.Cimmers, L.Krage, G. Sedmale, J.Setina, I.Sperberga, R.Svinka, V.Svinka

and $Al(OH)_3$) with the addition of different dolomites, clays and quartz sand. Powder mixtures were sintered at different temperatures both using pressureless and spark plasma sintering methods. It was stated that secondary crystalline phases like anorthite, spinel, corundum are often present together with a glassy phase and final mixtures determine the properties of the obtained ceramics. Suitable densification levels of investigated compositions were attained using different obtaining methods. Mineralogical composition, microstructure and physical properties were detected using XRD, SEM, water immersion and mechanical strength tests.

INFLUENCE OF KAOLIN AND FIRING TEMPERATURE ON THE MULLITE FORMATION IN POROUS MULLITE-CORUNDUM MATERIALS

L.Mahnicka, R.Svinka, V.Svinka

Riga Technical University, Institute of Silicate Materials, Azenes str. 14/24, LV-1048, Riga, Latvia, ludmila22mm@inbox.lv

The refractory ceramic became very important in both the traditional and the advanced materials applications as it has outstanding thermal and mechanical properties. The refractoriness of ceramics is achieved by getting the mullite-corundum. Refractory ceramics with high porosity serve as a heat insulator and constructional material. The aim of this work is to get, on the one hand, the refractory ceramics with high porosity and mechanical strength and, on the other hand, small shrinkage of material. Mullite formation in materials is carried out by using in corresponding ratio kaolin, alumina and silica as raw materials [1]. Three series of porous mullite-corundum ceramic samples are prepared from Al_2O_3 (Nabalox, Germany) and pure SiO_2 in 2.57:1 ratio that conforms to mullite compositions ($3Al_2O_3 \cdot 2SiO_2$). α-Al_2O_3 (d_{50}=4μm) and γ-Al_2O_3 (d_{50}=80μm) are in 1:3 proportion. Quantity of kaolin (MEKA, Germany) is 10, 20, 30 %. Porous materials were prepared by slip casting of suspension of raw materials, where the aluminium powder (0.18 wt%) is used as a pore formation agent. Water content in the suspensions is 28-30%.

Pore formation occurs in result of hydrogen formation in chemical reaction between aluminium powder and water with the following solidification of green bodies [2-3]. This method is used as it is more ecological than method of combustible additive. The samples are sintered at 1650, 1700 and 1750°C temperature for one hour.

Various testing methods such as XRD analysis (Rigaku Ultima+), shrinkage, pores sizes distribution by Hg porosimetry (Pore Master), bulk density, optical and SEM (Oxford instrument) microscopy and three point bending strength (ZwickBDO-FB020TN) were used to study the properties of the samples.

When kaolin is used, bulk density and mechanical strength of the samples increase. SiO_2 and γ-Al_2O_3 on the contrary reduce mechanical properties, but decrease shrinkage. Using of γ-Al_2O_3 the samples with open porosity of 30 to 42 vol% were acquired. The relative amounts of pores depend on the initial composition of kaolin.

REFERENCES

1. **M.Martinor N.Torres, I.C.Freestone, A.Hunt, T.Rehrenz,** *J. Am. Ceram. Soc.*, 6, 2071–2074 (2008).
2. **T.Juettner, H.Moertel, V.Svinka, R.Svinka,** *J. Eur. Ceram. Soc.*, 27, 1435-1441 (2007).
3. **V.Svinka, H.Moertel, S.Krebs,** Foam ceramics having a directed pore structure. *Pat.* WO 03/008357 A2 (30.01.2003).

CONTENT

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