

Preparation process of a highly resistant anorthite based ceramics using local raw materials: Effect of Na₂CO₃ additions on sintering and crystallization

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Abstract

Anorthite (CaO·Al₂O₃·2SiO₂) is mainly used for traditional ceramics. In this study, anorthite based ceramics was obtained by solid state reaction. The new selected composition was 80 wt.% kaolin (DD2 type) and 20 wt.% calcium oxide (CaO) extracted from CaCO₃. The choice of these raw materials was dictated by their natural abundances. Moreover, different amounts of Na₂CO₃ (0.5-3.0 wt.%) have been added in order to promote densification and lower down its sintering temperature. Optimizing the main parameters controlling anorthite based ceramics production such as milling techniques, compacting pressure, sintering temperature and holding time may lead to better anorthite based ceramics. The prepared samples were sintered at different temperatures ranging between 800 and 1100 °C for 1 h. A relative density of about 97% of the theoretical was reached for samples containing 3 wt.% Na₂CO₃ sintered at 1000 °C for 1 h. A porosity ratio of about 4% for samples containing 3 wt.% Na₂CO₃ sintered at 1000 °C for 1 h. Finally, these fabricated products were also characterized by scanning electron microscopy, X-ray diffraction and Raman spectroscopy.

Keywords: Anorthite; kaolin; calcite; Na₂CO₃ additions; sintering.