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Flash sintering of glass containing alumina bodies

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Flash Sintering of glass containing alumina bodies

Energy saving and reduction of environmental costs are two of the most important issues for the ceramic industry of the 21st century. Field Assisted Sintering (FAS) techniques were revealed as a very promising route in order to reduce sintering time and temperature.

Recent studies showed that it is possible to reduce the sintering time to few seconds by applying an E-Field at an onset temperature. This process, called Flash Sintering, is accompanied by a drastic drop in the resistivity of the ceramic. Many semi conductive or conductive materials were studied like zirconia, zinc oxide, GDC, silicon carbide, MnCo_2O_4 , $(\text{La,Sr})(\text{Co,Fe})\text{O}_3$. Other authors focused their research on the so called Flash Softening, demonstrating that the application of a Field is also very effective in reducing the softening temperature of a glassy phase.

In the present work the effect of the addition of three vitreous phase, with different conductivity, on the FAS of alumina are studied. Different field and current density are applied in the range 500-1500 V/cm and 0.6-2 mA/mm² respectively.

It is analysed in detail how the glass changes the sintering temperature, the sintering rate and the final density of the alumina bodies.