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Flash sintering of lead zirconate titanate (PZT) ceramics: Influence of electrical field and current limit on densification and grain growth

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Abstract:

Flash sintering of lead zirconate titanate ceramics were investigated under DC electric fields ranging from 300 to 600 V/cm. The onset temperature for flash sintering significantly decreased with the electrical field to a lower limit of furnace temperature of 538 °C at 600 V/cm. The retardation of grain growth was observed, and the grain size decreased with increasing the electrical field. The current limit had a great influence on the density and grain size of specimen. During the flash sintering process, power dissipation first rose abruptly to a maximum value, then declined sharply to a steady state. Meanwhile, optical glow of specimen was observed. Using black body radiation model, the actual specimen temperature was estimated, which was too low to obtain the full dense ceramics in 30 s. It was suggested that Joule