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Title:Structural and microwave properties of silica xerogel glass-ceramic sintered by sub-millimeter wave heating using a gyrotron
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Abstract:In this paper, we present and discuss experimental results from a microwave sintering of silica glass-ceramics, produced from amorphous silica xerogel extracted from sago waste ash. As a radiation source for a microwave heating a sub-millimeter wave gyrotron (Gyrotron FU CW I) with an output frequency of 300 GHz has been used. The powders of the amorphous silica xerogel have been dry pressed and then sintered at temperatures ranging from 300 °C to 1200 °C. Microwave absorbing properties of the sintered samples were investigated by measuring the dielectric constant, the dielectric loss, and the reflection loss at different frequencies in the interval from 8.2 to 12.4 GHz. Furthermore, the characteristics of the formation process for producing silica glassceramics were studied using a Raman Spectroscopy and a Scanning Electron Microscopy (SEM). The results indicate that the samples sintered at 1200 °C are characterized by lower reflection losses and a better transparency due to the formation of a fully crystallized silica glass-ceramic at sufficiently high temperature. © Springer Science+Business Media, LLC 2012.
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