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Publication date:
2012

Document Version
Early version, also known as pre-print

[Link to publication from Aalborg University](#)

Citation for published version (APA):

König, J., Petersen, R. R., & Yue, Y. (2012). *Foaming of waste cathode ray tube panel glass via CaCO_3* . Abstract from Nordic Conference on Ceramic and Glass Technology, Roskilde, Denmark.

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Foaming of waste cathode ray tube panel glass via CaCO_3

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The disposal of obsolete electrical and electronic equipment has become a global environmental problem. However, with responsible collecting, dismantling and materials separation, majority of materials can be recycled. Cathode ray tube (CRT) glass represents as much as two-thirds of the weight of a TV. In general CRT consists of two types of glasses: barium/strontium containing glass (panel glass) and lead containing glass (funnel and panel glass). In this work we present the possibility to produce high quality foam glass from the recycled lead-free glass. We study the influence of foaming parameters on the characteristics of foam.

CRT panel glass was crushed, milled and sieved below 63 μm . CaCO_3 was used as a foaming agent and was mixed with glass powders by means of a planetary ball mill. Preliminary results show that milling conditions and particle size have a major influence on the foaming process and resulting density of samples. We investigate the influence of foaming agent concentration on the foaming process, foam density, foam porosity and homogeneity. We demonstrate how milling and foaming conditions affect the foam properties for different amounts of CaCO_3 . A minimum in the density of foams has been observed with respect to milling time, while homogeneity of foam has been improved with longer milling time. The results also show that for a higher content of foaming agent the milling time needs to be prolonged in order to obtain lower density and homogeneous porosity. Such behavior is due to stronger interaction between the glass and CaCO_3 particles, which lowers the decomposition temperature of the foaming agent.