

Formation and particle growth of tio₂ in silica xerogel glass ceramic during a sintering process

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Abstrak

This investigation presents the synthesis procedure and the results of an investigation of the crystallite growth of TiO₂ and the formation of Si–O–Ti bonds in novel silica xerogel (SiO₂) glass ceramic produced from an amorphous SX derived from sago waste ash. The composition had been prepared by adding various amounts of TiO₂, from 20 wt% to 80 wt%, into the amorphous SiO₂, and then a series of samples were sintered at 1200°C for 2 hours. The influence of the content of TiO₂ and the sintering temperature on the properties of TiO₂, namely crystallite size and formation of Si–O–Ti bonds, has been studied in detail. The properties of the produced ceramics have been characterized on the basis of the experimental data obtained using X-ray diffraction (XRD) and Fourier transform infrared (FTIR) spectroscopy. It has been found that an addition of SiO₂ confers an appreciable effect on the quantity of Si–O–Ti bonds. The interpretation of the XRD pattern allows one to explain the increase in the crystallite size of rutile TiO₂ by a decreased quantity of Si–O–Ti bonds.