

## Formation and particle growth of $\text{TiO}_2$ 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  $\text{TiO}_2$  and the formation of Si–O–Ti bonds in novel silica xerogel ( $\text{SiO}_2$ ) glass ceramic produced from an amorphous SX derived from sago waste ash. The composition had been prepared by adding various amounts of  $\text{TiO}_2$ , from 20 wt% to 80 wt%, into the amorphous  $\text{SiO}_2$ , and then a series of samples were sintered at  $1200^\circ\text{C}$  for 2 hours. The influence of the content of  $\text{TiO}_2$  and the sintering temperature on the properties of  $\text{TiO}_2$ , 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  $\text{SiO}_2$  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  $\text{TiO}_2$  by a decreased quantity of Si–O–Ti bonds.