

# Crystallization of anatase TiO<sub>2</sub> in niobium potassium phosphate glasses

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In this work, the glass forming ability was studied in potassium phosphate glasses with increasing amounts of TiO<sub>2</sub> in order to obtain a glass-ceramic with photocatalytic properties<sup>1</sup>. The first studied series has been the binary system (100-x) KPO<sub>3</sub>-xTiO<sub>2</sub>. Homogeneous and transparent glasses could be obtained with x varying from 10 to 30 mole%. Since the photocatalytic anatase phase could not be precipitated in this system, the ternary system KPO<sub>3</sub>-TiO<sub>2</sub>-Nb<sub>2</sub>O<sub>5</sub> was investigated in order to incorporate higher TiO<sub>2</sub> contents without spontaneous crystallization under cooling. Thermal properties of all glass samples were investigated by DSC and allowed identifying an increase of glass transition temperatures with increasing TiO<sub>2</sub> and exothermic events related with crystallization were observed and suitable heat-treatments resulted in specific crystalline phases identified by X-ray diffraction. Selective precipitation of the anatase TiO<sub>2</sub> was successfully obtained from the glass composition 35KPO<sub>3</sub>-25Nb<sub>2</sub>O<sub>5</sub>-40TiO<sub>2</sub> (KN25T40) after heat treatment at 720°C for 2 h, suggesting the possibility of obtaining a glass-ceramic for photocatalytic applications. Structural investigations by Raman were performed on glasses and glass-ceramics and allowed to point out the presence of the anatase TiO<sub>2</sub> in the KN25T40 glass-ceramic.

## References:

1 Yoshida, K.; Masai, H.; Takahashi, Y.; Ihara, R.; Fujiwara, T.; *J. Ceram. Soc. Jpn.* 2013, 121, 999-1003.

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