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Studies on the Glass Ceramics of the System ZnO-MgO-Al_2O_3-TiO_2-SiO_2

Kouzou SHIOURA*

1. On the system ZnO-MgO-Al_2O_3-TiO_2-SiO_2, the range of composition, in which vitrification is possible and crystalization happens easily with heat treatment, were estimated.

2. About 50 g batch (extra pure reagents) was melted in a gas furnace. Samples of rods. 1~2 mm dia. were made by drawing.

3. The glass in this system was especially excellent when $MgSiO_3$ and TiO_2 were adden to $ZnAl_2O_4$ and $MgAl_4Si_5O_{18}$. The samples, which were gradually heat treated till 900°C, softend at 1150°C. Young's modulus of this glass increased with rise of the temperature of heat treatment. The bending strength of the sample was maximum when heat treated at 950°C and decreased by higher temperature treatment. By electron microscopic observation, it was found that the particles of crystals were very fine at 950°C, and the grain growth of these crystals was observable above 1050°C. The quantity of crystal incrased slowly between 900° and 1050°C, and increased rapidly with the treatment at higher temperature. From these results, the relation between the mechanical stregth and the state of crystal sparation, especially the particle size, the distribution of orystals in glars marix, and the rate of the crystallization were discussed.

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