

Chapter 5

Conclusion

From the study on nucleation and crystallization of CPG, CPG1, CPG2, and CPG3 glass samples, it could be concludes as follows:

1. CPG and CPG3 glasses had the activation energy of crystallization about 117.9 and 244.5 kJ/mol, respectively, the crystal growth was as a bulk crystallization, and had the maximum nucleation temperature at 487 ° and 579 °C, respectively. CPG1 glass had the activation energy of crystallization about 363.3 kJ/mol, the maximum nucleation temperature at 569 °C., and the crystal growth was as a surface crystallization. Finally CPG2 glass had the activation energy of crystallization about 236.8 kJ/mol, the maximum nucleation temperature at 559 °C, and the crystal growth was as a surface crystallization along with a bulk crystallization.

2. The behaviors of nucleation and crystallization of glass was dependent on the glass composition. In this research work, it was found that the calcium phosphate glass with the high amount of impurities had the higher activation energy of crystallization. This meant that the crystal occurred more hardly.

3. It was found that the nucleation rate overlapped with the crystal growth and the occurred crystal was dendrite crystal.

From these behaviors, it was more suitable to apply as glass-ceramics and also the condition of glass-formation had to be considered.

The formation of glass fibers by direct-melt method could not be used with calcium phosphate glass type, due to this glass had a fast crystallization and a low viscosity. If the viscosity was suitable to draw the glass fibers, the temperature would be too low so that the crystallization occurred. In contrast, at the high temperature the whole crystal was melted and the viscosity was too low to draw the continuous glass fibers. The CPG1 was the only composition able to draw a short fiber out at 1100 °C.



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