Kanungnuch Keawsupsak 2010: Development of Mica-Based Glass-Ceramics with Fluorapatite Variation for Restorative Dental Applications. Master of Engineering (Materials Engineering), Major Field: Materials Engineering, Department of Materials Engineering. Thesis Advisor: Assistant Professor Duangrudee Chaysuwan, Ph.D. 149 pages.

The purpose of this research was to study the effect of fluorapatite variation on thermal behaviors, crystalline phases, microstructures, mechanical properties, machinability and chemical solubility of the mica-based glass-ceramics. The glass-ceramics in the glass system of SiO_2-Al_2O_3-MgO-MgF_2-$SrCO_3$-$CaCO_3$-CaF_2 and P_2O_5 were produced by variation of fluorapatite content between 3.0-5.0 mol% and called GCF3.0-5.0, respectively.

The results were found that the higher the fluorapatite content, the lower the glass transition and peak crystallization temperatures. Furthermore, the increasing fluorapatite content influences to the crystalline structures of both calcium-mica and fluorapatite. All of the glass-ceramics revealed mainly plate-like calcium-mica and needle-like fluorapatite structures on surfaces whereas the plate-like structure was mainly shown in bulks. Mechanical properties such as biaxial flexural strength, Vickers hardness and fracture toughness in each of glass-ceramics heated at different temperatures were presented that almost all of heat-treated glass-ceramics of T_{p1} gave the values higher than those of T_{p2}. The biaxial flexural strength, fracture toughness and chemical solubility values of all glass-ceramics would be suitable as core ceramics for dental restorations according to International Standard ISO 6872:2008(E). In addition, the coefficient of thermal expansion of the glass-ceramics was found close to that of the restorative materials. In this research, the most suitable type of glass-ceramics as a dental restorative material was GCF3.5 heat-treated at T_{p1}. However, its appearance for more aesthetic is required.

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