

Preparation and Fabrication of Lithium Disilicate Glass Ceramic as Dental Crowns via Hot Pressing Method

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Abstract : Two Lithium disilicate (LD) glass ceramics based on SiO₂-Li₂O-K₂O-Al₂O₃ system were prepared through glass melting method and then fabricated into dental crowns via hot pressing at 850°C and 900°C in order to study the effect of the pressing temperatures on their phase formation and microstructure. The factor such as heat treatment temperature (as-cast glass, 600°C and 700°C) of the glass ceramics used to press was also investigated the effect of an initial microstructure before pressing. X-ray diffraction (XRD) and scanning electron microscopy (SEM) were used to determine phase formation and microstructure of the samples, respectively. X-ray diffraction result shows that the main crystalline structure was Li₂Si₂O₅ by having Li₃PO₄, Li_{0.6}Al_{0.6}Si₂O₆, Li₂SiO₃, Ca₅(PO₄)₃F, SiO₂ as minor phases. Glass compositions with different heat treatment temperatures exhibited a difference phase formation but have less effect during pressing. Scanning electron microscopy analysis showed microstructure of lath-like of Li₂Si₂O₅ in all glasses. With increasing the initial heat treatment temperature, the longer the lath-like crystals of lithium disilicate were increased especially when using glass heat treatment at 700°C followed by pressing at 900°C. This could be suggested that LD1 heat treatment at 700°C which pressing at 900°C presented the best formation by hot pressing and compiled microstructure.

Keywords : lithium disilicate, hot pressing, dental crown, microstructure

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