

EFFECT of B₂O₃ and LiO₂ ADDITION on the SINTERING BEHAVIOUR of APATITE-MULLITE GLASS-CERAMICS SYSTEM

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Apatite- mullite glass-ceramics have been developed recently as dental materials. The effect of LiO₂ and B₂O₃ content on the sintering and devitrification behaviour of glasses in the Al₂O₃-SiO₂-P₂O₅-CaF₂-CaO (apatite-mullite) system along with the properties of the resultant glass-ceramics (GCs) was investigated in this study. Glasses were produced by conventional melt-quenching technique and the GCs were produced through sintering and crystallization of glass powder compacts. The resulting glass ceramics were characterised using variety of techniques including Differential Thermal Analysis (DTA), X-ray Diffraction (XRD) and Scanning Electron Microscopy (SEM). The XRD results indicated the crystallization of the apatite-mullite particles both with and without LiO₂ and B₂O₃ addition. Scanning electron microscopy (SEM) examination of heat treated glasses (glass-ceramics) revealed precipitation of rod shape apatite and nano-size spherical mullite particles. Sintering behaviour of glass powders was studied by measuring the percentage of shrinkage in the heat treated samples. GCs with higher amount of LiO₂ and B₂O₃ demonstrated better sintering behaviour and showed higher density values. The chemical resistances of the samples were determined by measuring their water absorption behaviour. The results also indicated that the presence of LiO₂ and B₂O₃ had beneficial effect on the sintering and water absorption behaviour of the samples.