
Study on the dielectric properties of lithium aluminosilicate base-glass and glass–ceramics

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Abstract

In this paper, the dielectric properties and structural analysis of lithium aluminosilicate base-glass (T1_~T5) and glass–ceramics with different Li/Na molar ratios are investigated. The base-glasses were prepared using the fusion method and tested for dielectric properties. The dielectric constants and loss values of all samples increase with the frequency of the tested electric field. When the amount of Li₂O in the component decreases and the amount of Na₂O increases, Na₂O has a higher polarization rate, lithium aluminosilicate glass dielectric loss value increases. Heat treatment of lithium aluminosilicate glass to obtain the corresponding glass–ceramics, and perform XRD testing and TEM analysis. All five base-glasses precipitated Li₂Si₂O₅ and LiAlSi₄O₁₀ crystals, and the dielectric constants of the glass–ceramics were all subsequently reduced due to the lower dielectric constants of both crystals than base-glass. The presence of glass crystals solidifies the alkali metal ions in the glass phase, making it difficult for them to migrate under the electric field. Therefore, as the amount of precipitated crystals increases, the dielectric loss value of the microcrystalline glass decreases.

Keywords: Glass–ceramics, Lithium aluminosilicate glass, Dielectric properties, Dielectric loss

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