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Structural properties and electrical transport characteristics of modified Lithium Borate Glass Ceramics

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Abstract: The studied glass ceramics were obtained by subjecting $(70\text{B}_2\text{O}_3-29\text{Li}_2\text{O}-1\text{Dy}_2\text{O}_3)-x\text{BT}$ (where BT corresponds to barium titanate) glasses to a suitable heat treatment. The XRD study performed on these samples confirmed the presence of crystalline phases formed in the glass ceramics. Spectroscopic studies like FTIR and Raman showed the presence of various structural units like BO_3 , BO_4 , TiO_4 , TiO_6 etc. Analysis of the FTIR spectra also depicts an increase in non bridging oxygens (NBO's) upon addition of BT. Electrical data of the samples has been analyzed in the framework of modulus and ac conductivity formalism. For this purpose the dielectric measurements as a function of temperature have been carried out on these samples in frequency range 1 Hz- 10^6 Hz. Experimental data of imaginary part of the electric modulus has been fitted to nonexponential Kohlrausch-Williams-Watts (KWW) function whereas ac conductivity has been analyzed using Jonscher's universal power law. A close agreement in the values of activation energy determined from electric modulus (E_r) and dc conductivity (E_{dc}) indicated the involvement of similar type of charge barriers in both relaxation and conduction processes. The observed decrease in the activation energy could be

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