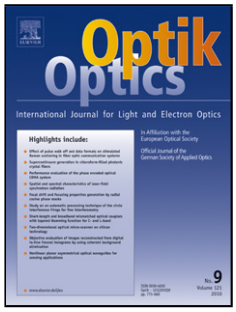

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On the dual role of halogen in magnesium oxyhalide bismuth borates glasses: Insight through optical absorption

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ABSTRACT

The present research communication deals with some significant outcomes related to the compositional dependence of optical absorption in magnesium oxyhalide bismuth borates glasses. These vitreous materials have been synthesized over very wide composition range of $x\mathrm{Mg}X_2\cdot(30-x)\mathrm{MgO}\cdot 20\mathrm{Bi_2O_3}\cdot 50\mathrm{B_2O_3}$ (X = Cl, F, Br and x = 0, 2, 5, 7, 10 mol%) via convenient melt-quench route. The analysis of fundamental absorption edge (from UV-Vis spectroscopy data) has been carried out in order to obtain optical band gap (E_{opt}) and band tailing parameter (B) corresponding to indirect allowed and forbidden Mott's transitions. The non-linear compositional variations of E_{opt} have predicted a dual role (network former and modifier) of halogen ions in the magnesium bismuth borate matrix. Moreover, evaluation of Urbach's energy