
Energy Band-Gap of Transition Metal Oxide Doped Borate Glasses by UV/Visible Spectroscopy

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Abstract:

Over the past few years, the study of the role of Transition Metal Oxides (TMOs) on the properties of various glass systems has been the subject of a great interest. In the present study Lead Borate Glasses doped with different transition metals have been prepared in laboratory by using Melt Quench Technique. The TMO doped borate glasses are mainly used for applications in electro-chemical, electronic and electro-optical devices. The TMOs selected for doping are Titanium, Copper and Silver. These transition metal ions when dissolved in B_2O_3 glass matrix, even in very small quantities, influence the physical properties very strongly. The absorption spectra in the wavelength range 200-900 nm of the prepared samples have been obtained by using UV/Visible spectroscopy. The Density values have been calculated by using Archimedes Principle. Density results for Titanium, Copper and Silver are $[Ti < Cu < Ag]$. A transmission window is observed in the spectra of Cu-doped glass sample which indicates the possibility of large number of applications in the field of nonlinear optics. The Band-Gap Energy values has been obtained by using Tau's Plots and it is found that there is a significant change in these values for different glass samples showing a significant change in the sample conductivities. The Band-Gap Energy increases as: $[Ti > Cu > Ag]$.