EPR and Optical Absorption studies on Vanadium doped Glasses

M.Sugathri, K.Jyothi, P.Madhusudana Rao, and B.Appara Rao

Department of Physics, Rayalaseema University, Kurnool, India
Department of Physics, Government college Rajahmundry, India
Department of Physics, JNTUH College of Engineering, Kukatpally, Hyderabad 500085, India
Material Science Department, Osmania University, Hyderabad 500 007, India

Abstract: Electron Paramagnetic Resonance (EPR) and Optical Absorption studies on glasses 20Li_2O – 10 Na_2O – (70-X) B_2O_3 doped with X=V_2O_5 are reported. EPR spectra of V^{4+} ions doped in the glass system exhibited a peak at g = 1.98. Spin Hamiltonian parameters g_||, g_⊥, I_||, I_⊥, I, dipolar hyperfine coupling parameter P, and Fermi contact interaction parameter K, have been calculated and found that these parameters are dependent upon alkali ion concentration in the glass system and the VO^{2+} ion in an octahedral coordination with a tetragonal compression. When the concentration of V_2O_5 is increased from 0.2 to 1.0 mole %, the Values of g_||, P decrease; values of K increase and values of g_⊥, A_||, A_⊥ are found to be constant. These values show that there is a tetragonal distortion of V^{4+} in Borate Glasses. Optical absorption spectra recorded in the range 300 - 900nm at room temperature showed a band at 800 to 850nm which is attributed to B_2→B_1 and B_2→E transitions.

Keywords: EPR, Spin Hamiltonian Parameters, Lithium Borate Glass.


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