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Investigation of some structural and optical properties of lithium sodium fluoroborate glasses containing cuprous oxide.

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Abstract

Lithium sodium fluoroborate glasses containing Cu_2O were investigated in terms of structural and optical modification. The measured density values are observed to increase as Cu_2O increase related to the replacement of some alkali cations by the higher density copper ions. Infrared absorption spectra for the investigated glasses show the characteristic structural bands or peaks for triangular and tetragonal borate units and the presence of fluorine ions may cause a replacement of some BO_3/BO_4 units by $\text{BO}_2\text{F}/\text{BO}_3\text{F}$ units, respectively. Optical band gap values are observed to decrease from 3.402 to 1.7 eV as the copper content increase. The refractive index values are varied from 2.296 to 2.880 as the copper content changed. The studied glasses tend to metallicity when copper ions embedded to borate network. Oxide/fluoride ions polarizability and optical basicity were correlated to the linear refractive index. The optical basicity based on refractive index behaves linearity associated with refractive index.

Keywords: alkali fluoroborate glass, cuprous oxide, density, optical properties, Infrared, optical basicity.

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