Abstract

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Optical and infrared properties of lithium diborate glasses doped with copper oxide: effect of gamma irradiation

A series of lithium diborate glasses containing successive CuO contents have been prepared by conventional melt annealing technique. Optical and infrared spectral properties have been measured before and after successive gamma irradiation to study the effect of gamma irradiation on the prepared glasses. Cu-doped samples show the same strong UV absorption as the undoped sample beside a characteristic broad visible band around 772 nm with marked splitting into four peaks at 614, 656, 774 and 1064 nm in higher CuO contents. Gamma irradiation of undoped lithium borate glass causes the generation of induced absorption bands but the introduction of CuO content causes some shielding behaviour towards successive gamma irradiation. Infrared absorption spectra of the undoped and CuO-doped glasses show characteristic vibrational absorption bands related to triangular and tetrahedral borate units. The addition of CuO in lithium borate glasses causes minor changes on the intensities of the IR bands but their numbers and positions are retained. The same limited effect is observed with gamma irradiation on the measured IR bands.