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Effects of rare earth oxides (La_2O_3, Gd_2O_3) on optical and thermal properties in B_2O_3–La_2O_3 based glasses

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The optical and thermal properties of B_2O_3–La_2O_3 based glasses, designed for digital imaging lenses, were investigated as a function of the Gd/(La+Gd) ratio in the glasses. The refractive index decreased gradually with increasing Gd/(La+Gd) ratio, although the change of refractive index was small. The liquidus temperature (LT) showed a minimum of 970°C for the glass with a Gd/(La+Gd) ratio of 0·5. The viscosity at the LT reached a maximum for the glass with a ratio of 0·5, although the viscosity determined at 1040°C for the glasses was found to increase gradually with increasing Gd/(La+Gd) ratio. X-ray diffraction measurements indicated that the crystalline phase in the glasses below the LT depended strongly on the Gd/(La+Gd) ratio. The effect of the Gd/(La+Gd) ratio on the refractive index, dispersion, density, LT and viscosity is discussed in terms of glass structure.