

Laser operated elasto-optical features of $\text{La}_2\text{CaB}_{10}\text{O}_{19}:\text{Pr}^{3+}$ polymer nanocomposites

Abstract

We have discovered a principal role of the polymer matrices on the spectral dependences of piezooptical coefficients of $\text{La}_2\text{CaB}_{10}\text{O}_{19}:\text{Pr}^{3+}$ (LCBO:Pr) nanocomposites formed by polymethylmethacrylate (PMMA) and polycarbonate (PC) matrices. It was established that the optical treatment by the 10 ns Nd:YAG laser can cause substantial changes of the dispersion of the piezooptical coefficients within the spectral wavelength 1400-1600 nm. The optimal content of the LCBO:Pr with sizes ranging from 40 to 110 nm corresponds to 4-6% in weighing units. Following the performed quantum chemical simulations, the observed changes are caused by different polarizabilities of the polymer matrices