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Influence of lattice modifier on the nonlinear refractive index of tellurite glass

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Abstract

We studied the influence of different lattice modifiers (Nb_2O_5 , Bi_2O_3 , or TiO_2) on the nonlinear refractive index of a tellurite glass matrix by using the Z-scan technique. Based on the ability of the lattice modifiers to decrease the band-gap energy while simultaneously increasing the linear refractive index of the TeO_2 -based glass, we investigated how these modifiers affect the nonlinear refractive indices. All studied glass presented high nonlinearities, and the addition of lattice modifiers made only a small contribution to increasing magnitude. These results could be explained through the observation of the band-gap energy reduction, which is related to the increase in the non-bridging oxygen content with the addition of the lattice modifier. The increase in the refractive index nonlinearity is explained by the optical basicity and the high electronic polarizability of the modifiers ions.

Keywords: Tellurite glass, lattice modifier, nonlinear refractive index, structural change, z-scan.

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