Optical properties of Bi_3TeBO_9 crystalline materials doped with rare earth ions

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Bi_3TeBO_9 microcrystalline materials doped with selected rare earth ions exhibit a dual nature: they are excellent non-linear optical materials as well efficient phosphors. Pure Bi_3TeBO_9 crystals show high efficiency of second and third harmonic generation; the highest among borate materials (second harmonic generation signal was greater by about 20 times compared to the intensity of that generated in KDP crystal)[1]. Moreover, incorporation of trivalent rare earth ions into Bi_3TeBO_9 matrix induces an effective luminescent response [2-4].

Crystals doped with rare earth ions are commonly known as laser active media [2-4]. Moreover, incorporation of rare earth ions enriches the materials and allows a wide range of applications in optoelectronic systems, phosphors or solar cells [2-4]. The unique properties of rare earth ions are connected with the appearance of luminescence bands that correspond to the *f-f* transitions [2-4].

In this research, we present the results of investigation of luminescent and vibrational properties of Bi_3TeBO_9 materials doped with selected rare earth ions, using Raman and optical spectroscopy methods. The results show that Bi_3TeBO_9 materials doped with selected rare earth ions offer a significant luminescence potential and can be proposed as efficient spectral converters in the new type solar cells enhancing the efficiency of the photovoltaic effect.

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