

Photorefractive behavior of BaTiO₃ crystals and their application in optical metrology in real time

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Abstract: In this research we measure some of the optical parameters of Barium Titanate crystal (BaTiO₃), such as signal beam gain, coupling constant (exponential gain coefficient), change in index refraction and photorefractive sensitivity, which are very significant for optical data storage. In all experiment, two-wave mixing configuration at 632.8 nm (He-Ne laser) were used. Experimental data for change in signal beam gain versus input angle of two beam, beam intensity ratio, pump beam intensity and grating vector, were plotted and compared with Kukhtarev theory. Using of experimental data, we calculated other optical parameters such as exponential gain coefficient, change in index refraction and photorefractive sensitivity. The results are good and the crystal can be used for optical data storage, dynamic holography, etc. For a - wave mixing configuration, the same crystal as a recording medium for real time displacement has been used. For measurement of distant object a high coherent source such as He-Ne laser has can been used. Long coherence length of the laser permit to study the objects which are far away from the crystal. The influence of intervening medium must be negligible.

Keywords: *Barium Titanate Crystal, Photorefractive Effect, Two-Wave Mixing, Real Time Displacement Measurement.*