

Electronic spectral parameters and IR nonlinear optical features of novel $\text{Ag}_{0.5}\text{Pb}_{1.75}\text{GeS}_4$ crystal

Abstract

In this paper, we report on novel $\text{Ag}_{0.5}\text{Pb}_{1.75}\text{GeS}_4$ single crystals grown by the Bridgman-Stockbarger method. For these crystals we have performed X-ray photoelectron spectroscopy (XPS) studies of the valence-band and core-level electron states. Second harmonic generation efficiency of $\text{Ag}_{0.5}\text{Pb}_{1.75}\text{GeS}_4$ powder samples by using CO_2 laser light depending on the power density up to 1100 MW/cm^2 has been obtained within the temperature range 77-520 K. The obtained dependences indicate relatively strong enhancement of photoinduced SHG output efficiencies as temperature increases. Both the spectra taken at ambient and 520 K temperatures have shown similar behavior - rapid growth to saturated values of SHG efficiency with an increase of fundamental beam power density up to 400 MW/cm^2 , then slowly decreasing with power density reaching a value of 800 MW/cm^2 and finally these features show a second small maximum at a fundamental beam power density equal to 900 MW/cm^2 . Beyond this power density both SHG values start to decrease