Journal of Basic and Applied Engineering Research
Print ISSN: 2350-0077; Online ISSN: 2350-0255; Volume 2, Number 4; January-March, 2015, pp. 324-324

http://www.krishisanskriti.org/jbaer.html

Nonlinear Optical Performance of Pb Doped Se-Te-Bi chalcogenide Thin Films

Preeti Yadav[1*] and Ambika Sharma[2]

[1,2]Department of Applied Sciences, ITM University, Gurgaon, Haryana (122017) India
E-mail: [*]preetiy.ggn@gmail.com

Abstract—*Nonlinear optical properties of chalcogenide glasses have attracted much attentionof the researchers due to their high transparency in far IR region(upto 22 µm), high linear and nonlinear refractive index, good glass forming abilities and low phonon energy. Therefore these materials act as a fundamental material in optical fibers, optical limiting devices, frequency generation etc. The objectiveof the present study is to find out the nonlinear optical properties of Pb doped Se-Te-Bi chalcogenide thin films. The glassy samples were prepared by well-known melt quench technique. Thermal evaporation technique has been used for the deposition of thin films on the cleaned glass substrate at a pressure of 10^{-4} Pa. The transmission spectra of the thin films in the spectral range 400 – 2500 nm were taken using UV-Vis-NIR spectrophotometer. The transmission spectra of thin film samples representthe fringes due to interference at different wavelengths(Figure 1).*

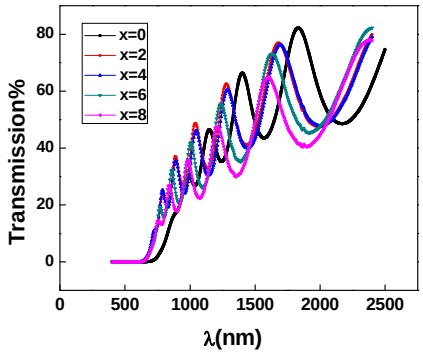

Fig. 1

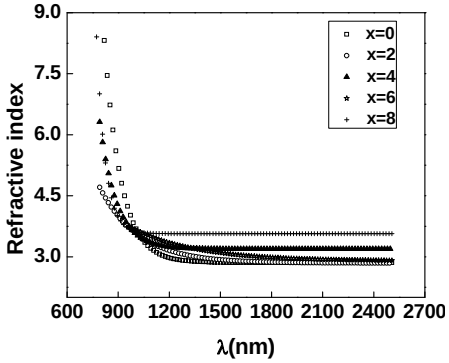

Fig. 2

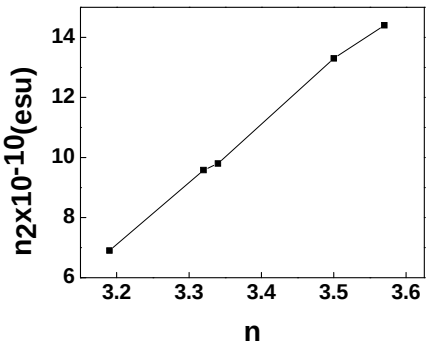

Fig. 3

The refractive index is calculated by well-known Swanepoel's method[1]. The linear refractive index (n)increases with increase in Pb composition which is ascribed to the increased polarizability of the larger atomic radius of Pb atoms (Figure 2). Tichy and Ticha[2]model utilized linear refractive index for the analysis of nonlinear refractive index (n_2) and is found to be increased 6.9x 10^{-10}esu to 14.4 x 10^{-10} esu with the addition of Pb content. The behavior of $n_2$with n is shown in Figure. 3 and it is found that n_2 increase linearly withn. The values of nonlinear refractive index of the studied composition are compared with pure silica and found to be 1000 times higher.

REFERENCES

[1] R. Swanpoel,*J.Phys. E.Sci. Instrum*.**16,** 1214-1222(1983).
[2] H. Ticha, L. Tichy,*J. Optoelectron. Adv. Mater*. **4,** 381-386(2002).