

**OPTICAL AND STRUCTURAL PROPERTIES OF
PbO-B₂O₃-TeO₂ GLASSES**

S.M. Iskandar^{1,2}, M.K. Halimah¹, W.M. Daud¹, H.A. A. Sidek¹,
M.D. Khairul Zaman³

¹*Physics Department, Universiti Putra Malaysia,
43400 UPM Serdang, Selangor.*

²*School of Physics, Universiti Sains Malaysia, 1800 USM, Penang*

³*Radiation Processing Technology, Malaysian Nuclear Agency,
43000 Kajang, Selangor*

ABSTRACT

Optical and structural properties of [TeO₂]_y [(B₂O₃)_{1-x} (PbO)_x]_{1-y} glasses of different composition have been studied using UV-Vis, Raman and XRD spectroscopic techniques. The UV optical absorption was recorded at room temperature in the wavelength range of 200 to 800 nm, while the XRD patterns of as-received samples was verified at 2θ = (5 - 80 deg). Eventually, values of the optical energy gap are calculated and found to be dependent on the glass composition. Furthermore, the XRD diffractograms exhibit a wide smooth halo, which is a fingerprint of amorphous materials and some strong narrow diffraction lines corresponding to crystalline of α-TeO₂. The Raman spectroscopy measurement shows strong existence of Pb group, O-B-O bending and O-Te-O stretching in lattice vibrations.

<http://journal.masshp.net/wp-content/uploads/Journal/2010/Jilid%202/S.M.%20Iskandar%2084-90.pdf>

REFERENCES

- [1] Joseph, C.M., P.R. Binu, R. Shreekrishnakumar and C.S. Menon, (2001). *Mater. Lett.* **50**: 251-253.
- [2] Vijaya Prakash, G., D. Narayana Rao and A.K. Bhatnagar, (2001). *Solid State Comm.*, **119**: 39-44.
- [3] Khaled, M.A., H. Elzahed, S.A. Fayek and M.M. El-Ocker, (1994). *Mat. Chem. and Phys.*, **37**: 329-332.
- [4] H. Hirashima, D. Arai, T. Yoshida, (1985) *J. Am. Ceram. Soc.* **68** 486.
- [5] H. Gahlman, R. Bruckner, (1974) *J. Non-Cryst. Solids* **13** 355.
- [6] J.E. Standworth, (1961) *J. Soc. Glass Technol.* **36** 271.
- [7] S.E. Van Kirk, S.W. Martin, (1992) *J. Am. Ceram. Soc.* **75** 1028.
- [8] J.F. DeNatale, D.G. Howitt, (1984) *Nucl. Instr. and Meth.* **B 229** 489.
- [9] G.J. Exarhos, (1984) *Nucl. Instr. and Meth.* **B 229** 498.
- [10] R. Cases, D.L. Griscom, (1984) *Nucl. Instr. and Meth.* **B 229** 503.
- [11] C.A. Worrel, J. Henshell, (1978) *J. Non-Cryst. Solids* **29** 283.
- [12] Khanna, S.S. Bhatti, K.J. Singh, K.S. Thind, (1996) *Nucl. Instr. and Meth.* **B 114** 217.
- [13] K. Singh, H. Singh, V. Sharma, R. Nathuram, A. Khanna, R. Kumar, S.S. Bhatti, H.S. Sahota, (2002) *Nucl. Instr. and Meth.* **B 194** 1.
- [14] H. Singh, K. Singh, G. Sharma, R. Nathuram, H.S. Sahota, (2002) *Nucl. Sci. Eng.* **142** 342.

- [15] Gopi Sharma, Kulwant Singh, Manupriya, Shaweta Mohan, Harvinder Singh, Sukhleen Bindra, (2006) *Radiation Physics and Chemistry* **75** 959-966.
- [16] Takao Sekiya, Norio Mochida, Atsushi Ohtsuka and Ayako Soejima, (1992) *Journal of Non-Crystalline Solids* **151** 222-228.
- [17]. M.A.P. Silvaa, Y. Messaddeqa, S.J.L. Ribeiroa, M. Poulainb, F. Villainc, V. Brioid (2001) *Journal of Physics and Chemistry of Solids* **62** 1055-1060.