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## Bonding arrangement in Sn doped Se-Te glassy alloy: Far IR study

Raman Sharma<sup>1</sup>, Pawan Heera<sup>1,2</sup> and Anup Kumar<sup>1</sup>

<sup>1</sup>Himachal Pradesh University, India

<sup>2</sup>Govt. College Amb, India

The chalcogenide glasses have been the subject of great interest due to their wide technological applications. The chalcogenide materials containing Te show high transmittance, i.e., 2-12  $\mu\text{m}$ , in the IR region. In the present work far infrared transmission spectra of  $\text{Se}_{30}\text{Te}_{70-x}\text{Sn}_x$  ( $x=0, 1.5, 2.5$  and  $4.5$ ) glassy alloys have been studied, at room temperature, in the spectral range 30–700  $\text{cm}^{-1}$ . Various structural parameters have been investigated in the light of existing models such as function of average coordination number  $\langle r \rangle$  and valence force field theory using force constants. The overall mean bond energy  $\langle E \rangle$  of a covalent network for a ternary system is interpreted in terms of vibrations of isolated molecular units, to preserve fourfold and twofold coordination for Sn and chalcogen atoms (Se, Te), respectively. The infrared spectra of  $\text{Se}_{30}\text{Te}_{70-x}\text{Sn}_x$  glassy alloy has been explained by assigning different modes to the observed bands. It is found that Sn forms bond with Se, having bond energy 49.23 kcal/mol, and is favored by the CONM model. It may be due to the fact that replacement of Te with Sn leads to absorptions that occur at longer wavelength. It is observed that addition of Sn results in shifting of infrared spectra towards lower frequency with formation of new bands as reported in the earlier studies. It has been correlated with the structural changes occurring in the alloy due to the addition of Sn.

### Biography

Raman Sharma has completed my PhD from Himachal Pradesh University, Shimla, India. He joined as faculty member in July 1999, at Physics Department, H. P. U., Shimla. He remained Chair person of the department from February 2013 to March 2015. He has been a member of various academic committees in the University. He has published more than 50 papers in reputed journals of international repute and has been serving as reviewer for different Journals of repute. His research interest includes theory, simulations as well as experimental study. Presently he is working on pristine and hetero structure nano tubes, chalcogenide materials, and trapped quantum gases.

[sramanb70@mailcity.com](mailto:sramanb70@mailcity.com), [pawanheera@yahoo.com](mailto:pawanheera@yahoo.com)

## Structural and optical properties of $\text{TiO}_2$ nanostructures

R S Dariani and Z Nafari Qaleh

University of Alzahra, Iran

This research examines the structural and optical properties of titanium dioxide ( $\text{TiO}_2$ ) nanostructures. The production process of  $\text{TiO}_2$  nanostructures involves three steps. First, a thin film of titanium was deposited on substrates by electron beam evaporation technique under the pressure of  $1.5 \times 10^{-5}$  mbar. Then a layer of gold was deposited as a catalyst on the titanium layer by a sputtering method. At this stage, the sample was placed in a quartz tube furnace. A tablet containing Ti and graphite powder in a ratio of 1:1 as a source was located in the center of the furnace with a temperature of 1050°C. Substrate was placed over the quartz tube at a distance 12-13 cm from the center of the furnace with a temperature of 850°C and was kept for 1h under argon gas flow as a carrier gas. Now, the effect of carrier gas flow on  $\text{TiO}_2$  nanostructures properties was studied. Three samples were gained at gas flow 60, 110, and 170 sccm. The SEM images indicate that with increasing gas flow, nanowires become thinner and longer. According to energy gap, all the samples are characterized by higher value of the energy gap than that of bulk rutile  $\text{TiO}_2$ .

### Biography

R S Dariani has completed his PhD from University of New South Wales and Postdoctoral studies from Queen's University School of Physics. Now he is Professor of Physics at Alzahra University and Editor in Chief of Alzahra University *Journal of Applied Physics*. He has got Third World Academy of Science (TWAS) grants for Spare Parts for Scientific equipment, Trieste, Italy, 2002 and Winner of the SVC best poster, The Society of Vacuum Coaters, Washington D. C., 2006. He has published more than 72 papers in reputed journals and serving as an Editorial Board Member of repute.

[dariani@alzahra.ac.ir](mailto:dariani@alzahra.ac.ir)