Optical and Photonic Glasses

Lecture 20:
Spectra of Fluorides and Chalcogenides

Professor Rui Almeida

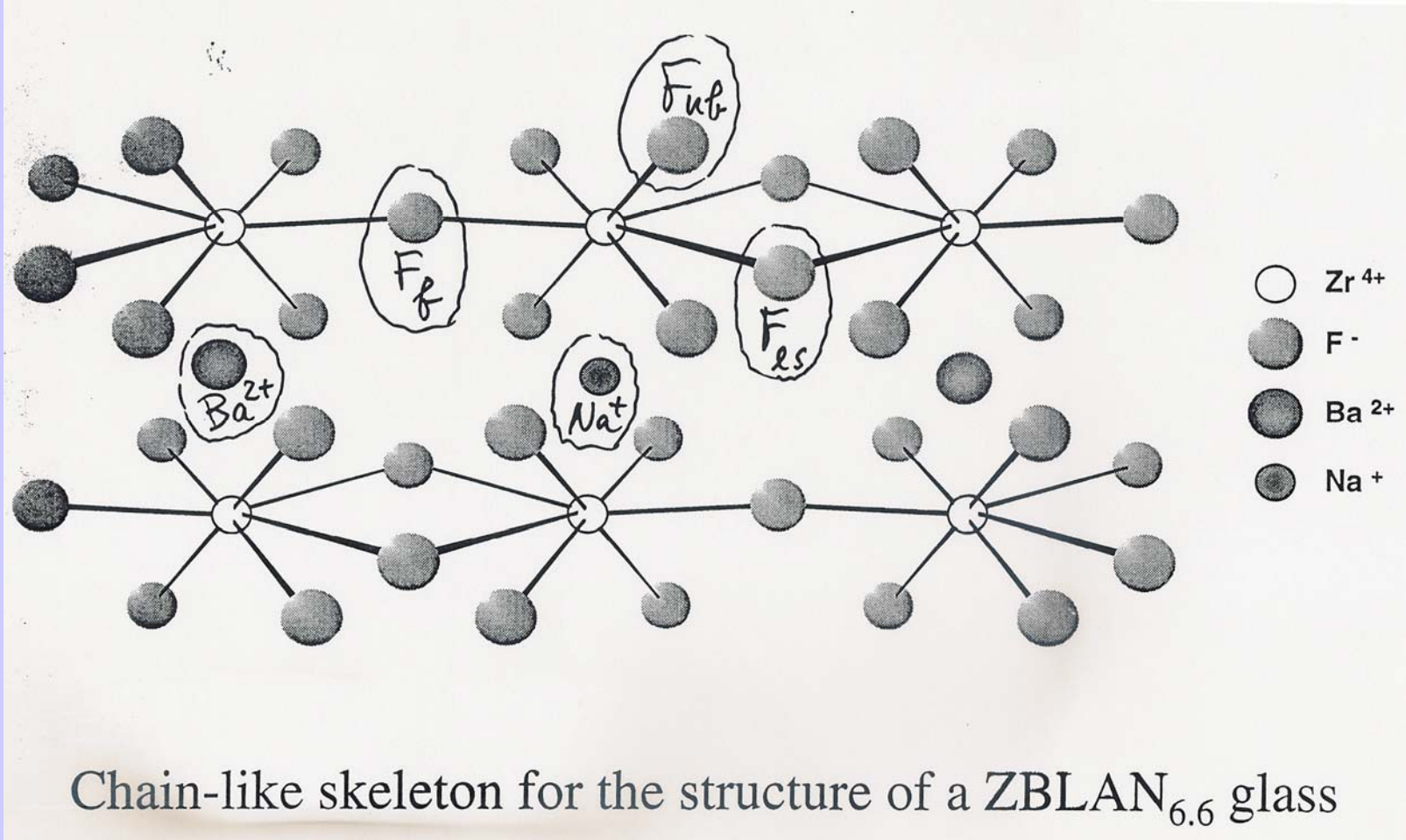
International Materials Institute

For New Functionality in Glass

Lehigh University

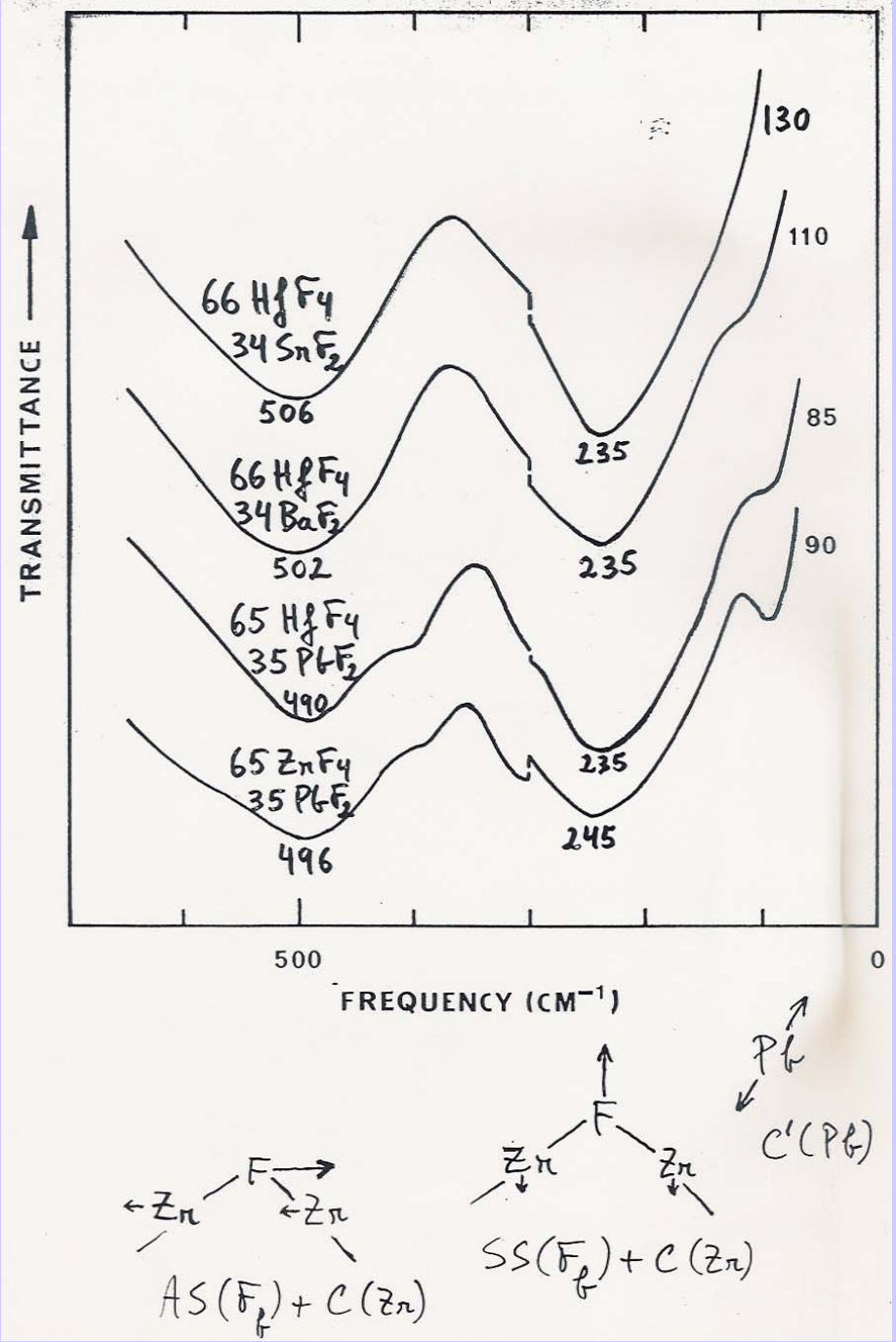
Structure

Chain-like structure of ZrF_4-based HMFG



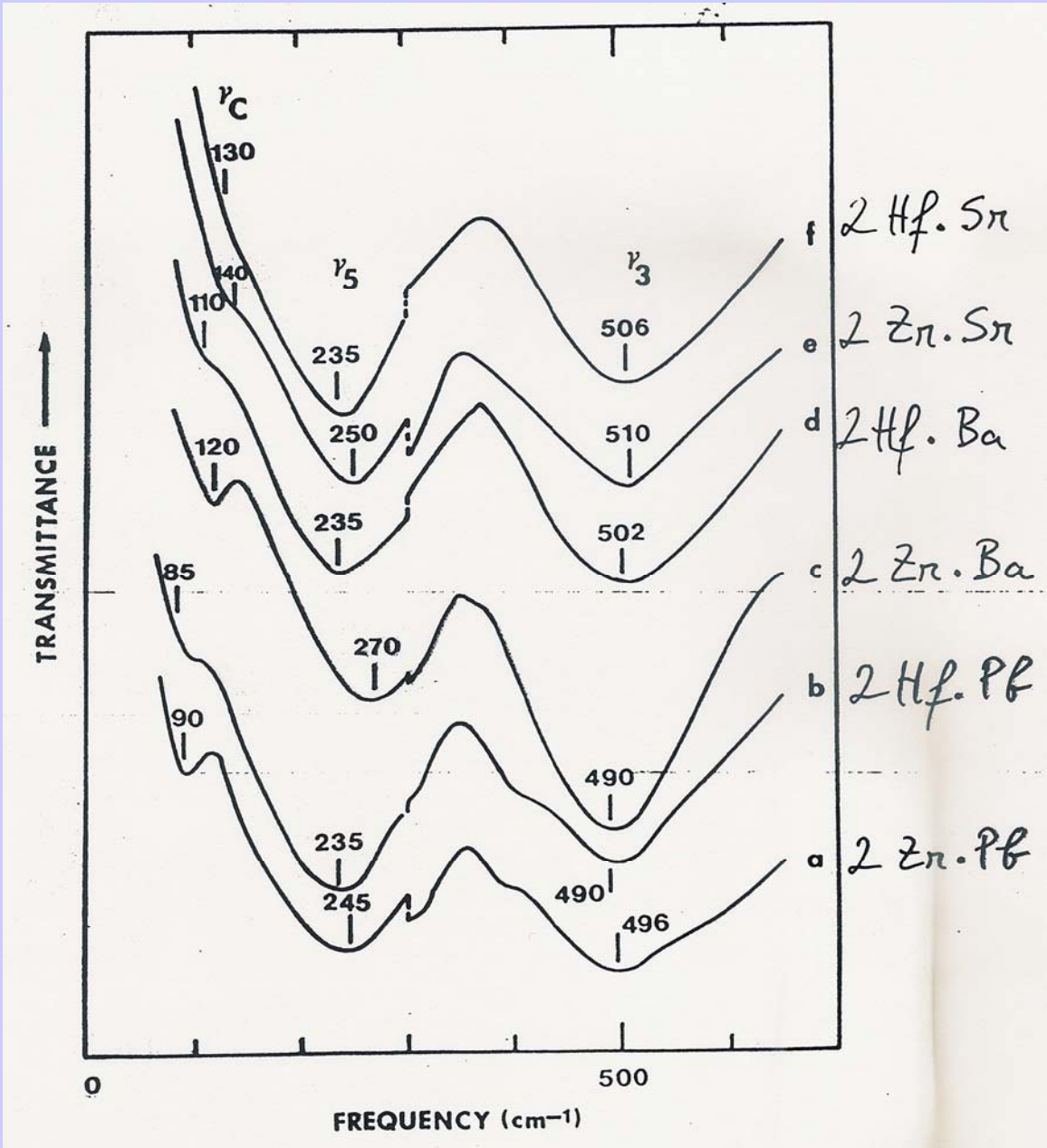
Chain-like skeleton for the structure of a $ZBLAN_{6.6}$ glass

First order IR spectra of HMFG



(R.M. Almeida, unpublished results)

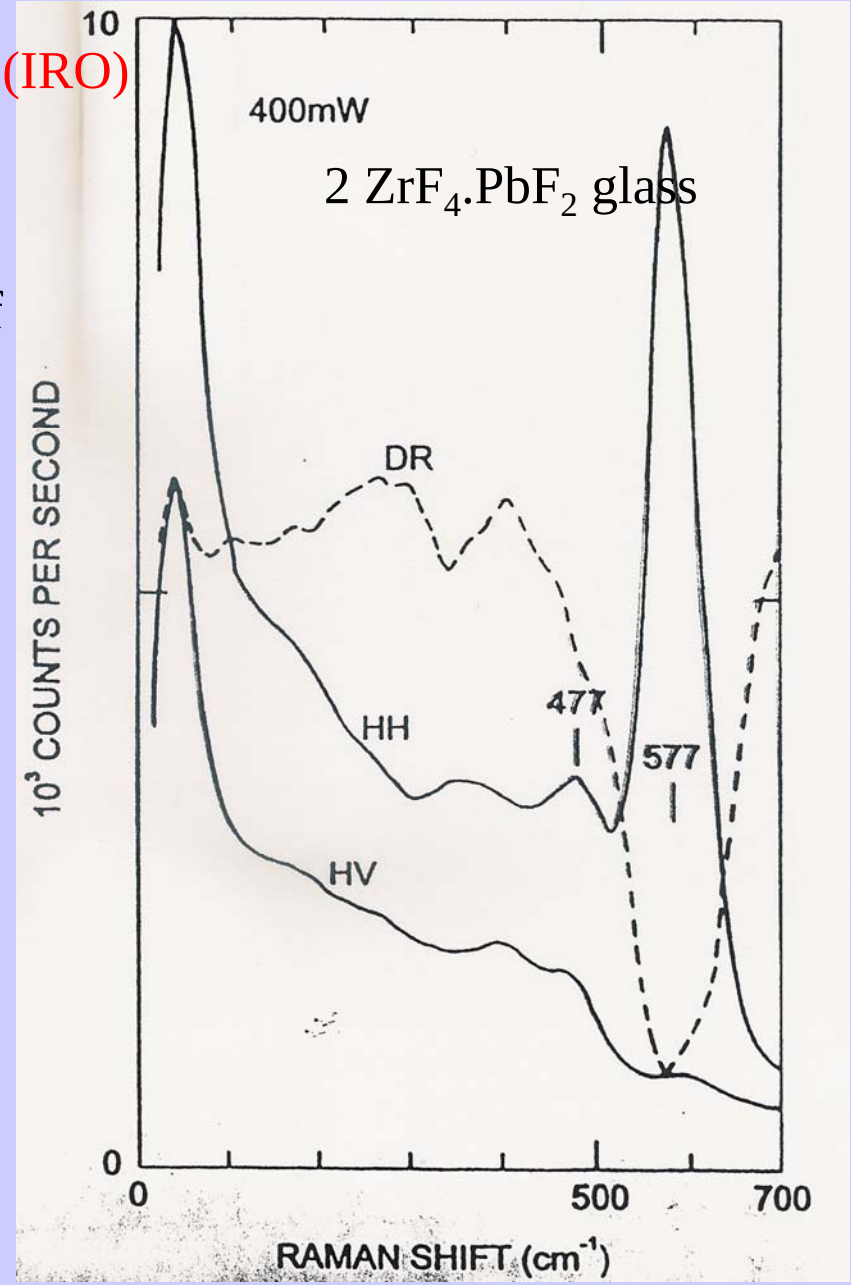
First order IR spectra of HMFG



(R.M. Almeida, unpublished results)

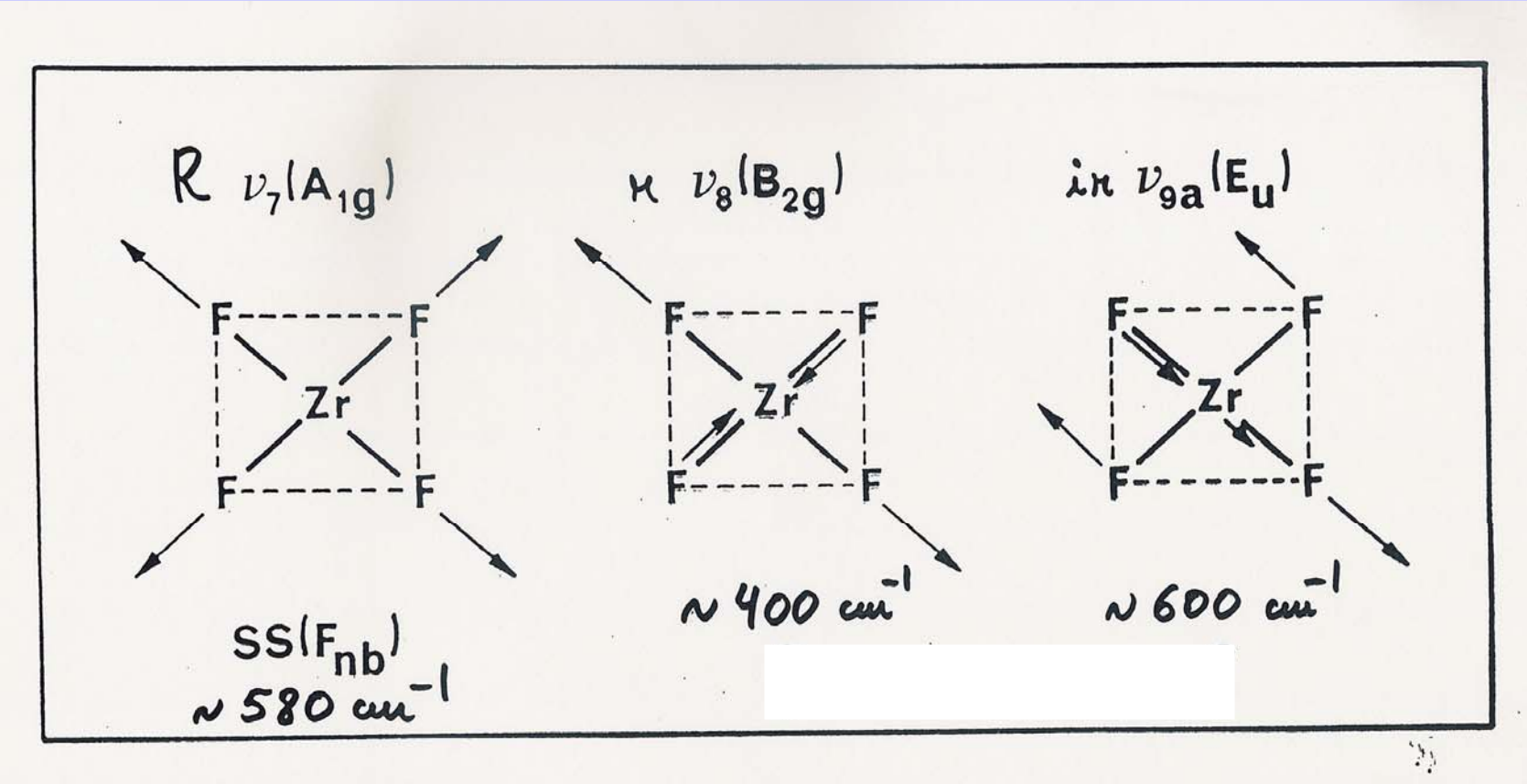
Boson peak (IRO)

First order polarized Raman spectra of HMFG



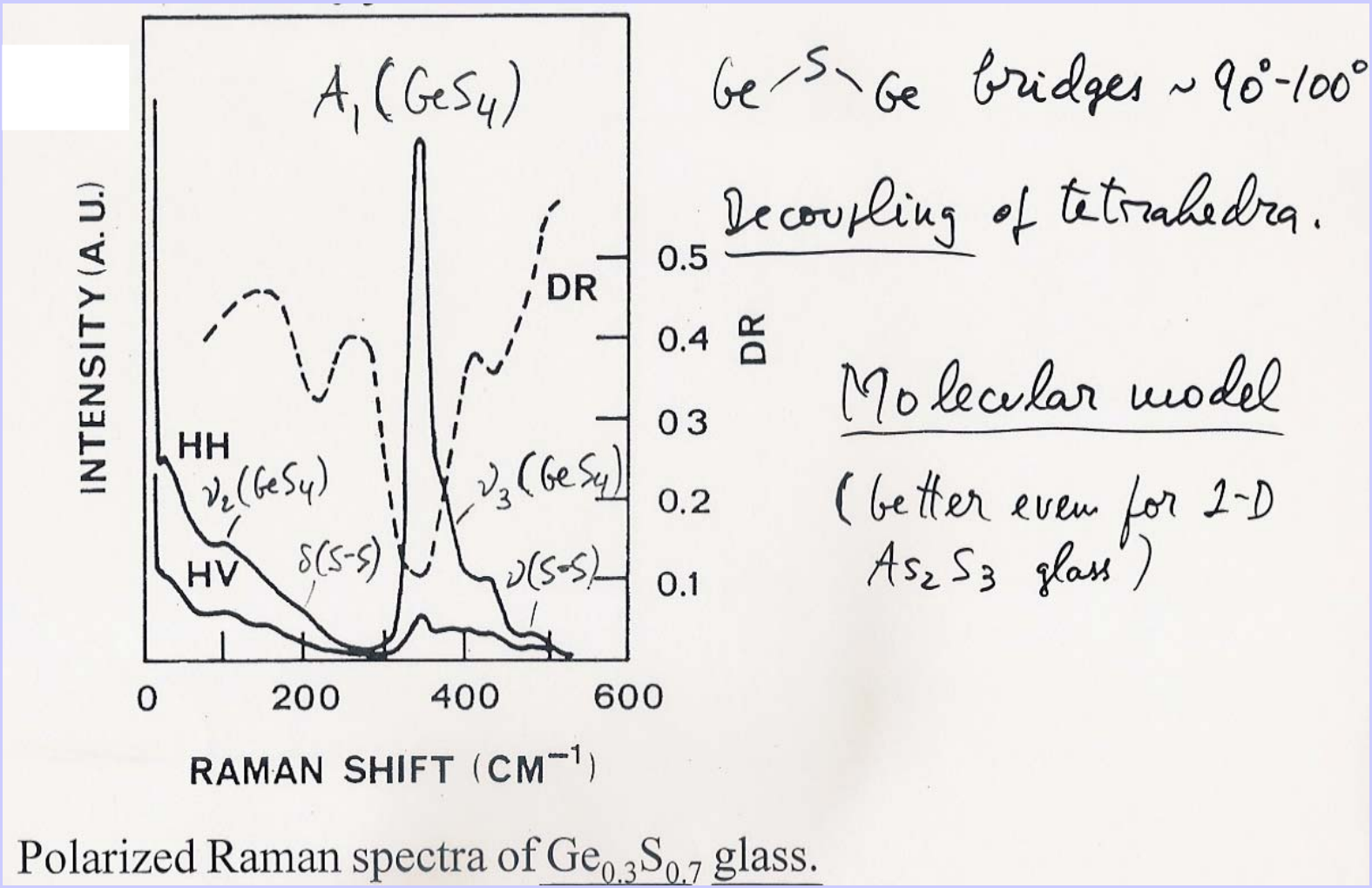
(Adapted from: R.M. Almeida, JNCS, 1992)

First order vibrational modes (IR, Ra) of HMFG



(R.M. Almeida, unpublished results)

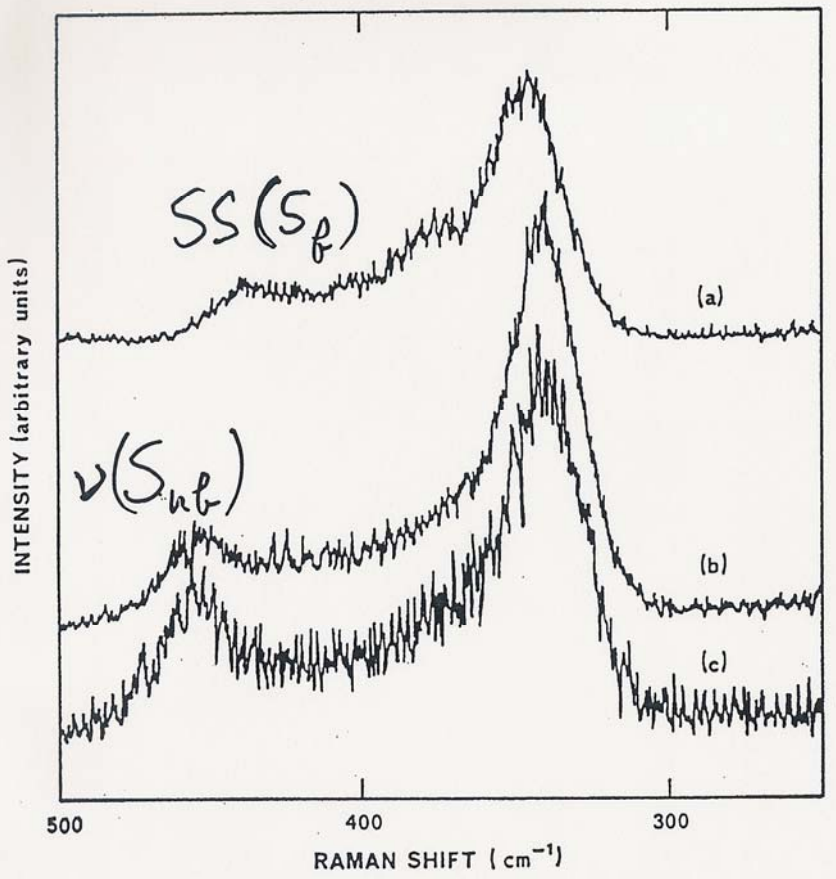
First order polarized Raman spectra of ChG



Polarized Raman spectra of $Ge_{0.3}S_{0.7}$ glass.

(Adapted from: G. Lucovsky et al., *Phys. Rev. B* 9 (1974) 1591)

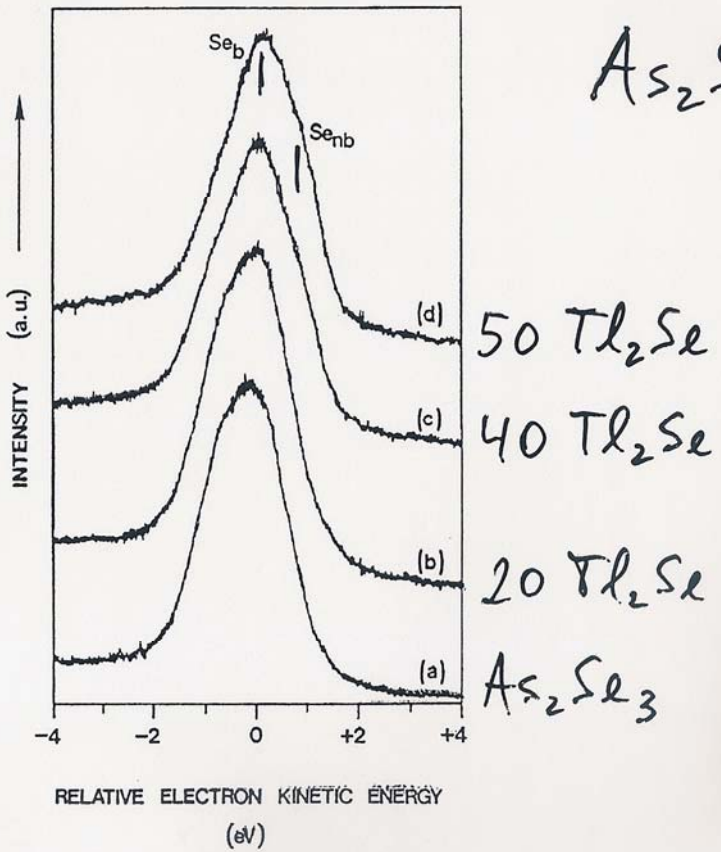
First order polarized Raman spectra of ChG: identification of NBS (S_{nb}) atoms



Polarized Raman spectra (HH) of glass samples: (a) GeS_2, (b) $90GeS_2$ - $10Tl_2S$ and (c) $85GeS_2$ - $15Tl_2S$.

(Adapted from: R.M. Almeida et al., *J. Mater. Sci. Lett.* 6 (1987) 701)

Identification of NBSe (Se_{nb}) atoms in ChG



Raw selenium 3d XPS spectra using $Mg_{k\alpha}$ X-rays for the following glass samples: (a) As_2Se_3, (b) $80As_2Se_3$ - $20Tl_2Se$, (c) $60As_2Se_3$ - $40Tl_2Se$ and (d) $50As_2Se_3$ - $50Tl_2Se$.

(Adapted from: H. Nasu et al., JNCS 95 (1987) 351