

Chalcogenide Glasses



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Class hours: Monday and Wednesday, 13:10 – 14:00 ET

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What do we study about ChG?

Synopsis

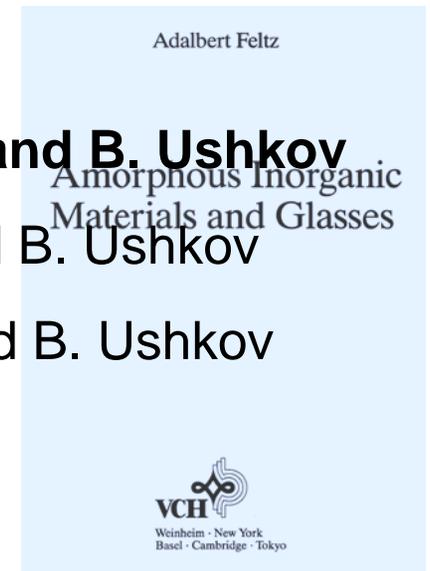
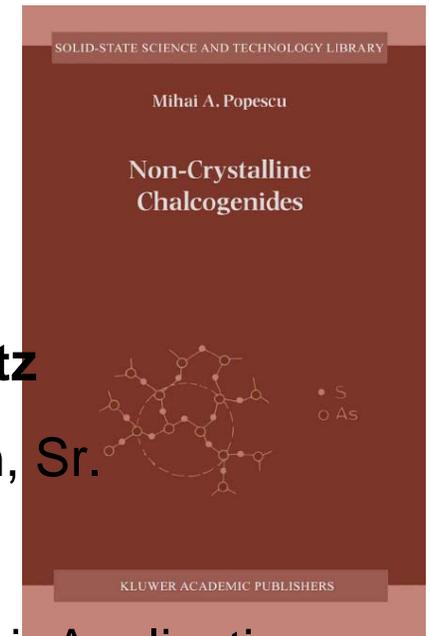
- ✓ This course will provide a broad introductory overview of chalcogenide glasses, which are a technologically important, high-tech sub-class of inorganic glasses that exhibit numerous unusual properties not found in common (oxide) glasses.
- ✓ The course will focus on distinctive characteristics (structure and properties) of chalcogenide glasses, and how they lead to broad range of existing and potential applications in photonics, electronics, ionics, etc.

What do we look at about ChG?

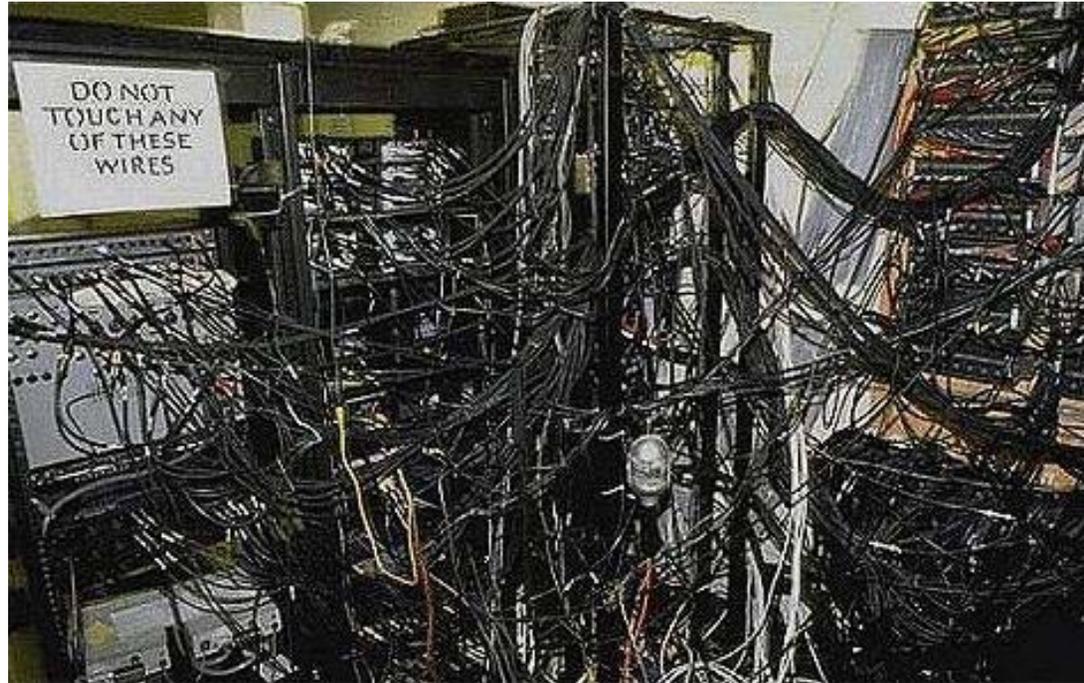
- ✓ Introduction: definition, brief history, characteristics and fabrication
- ✓ Glass formation and structural models
- ✓ Structure of some representative ChGs
- ✓ Physico-chemical properties
- ✓ Photo-induced effects
- ✓ Photonics aspects;
 - IR transmitting medium
 - Host for doping
 - Nonlinear optical material
 - Optical waveguide
 - Photoresist
- ✓ Electronics aspects;
 - Phase change random access memory
 - Switching device
- ✓ Ionics aspects (by Professor Steve Martin);
 - Models of ionic conduction in ChGs
 - Survey of fast ion conduction on ChGs

Reference books

- ✓ **Non-Crystalline Chalcogenides, M. A. Popescu**
- ✓ **Amorphous Inorganic Materials and Glasses, A. Feltz**
- ✓ Chalcogenide Glasses for Infrared Optics, A. Ray Hilton, Sr.
- ✓ Glasses for Infrared Optics, V. F. Kokorina
- ✓ Optical Nonlinearities in Chalcogenide Glasses and Their Applications, A. Zakery and S. R. Elliott
- ✓ **Semiconducting Chalcogenide Glass I, R. Fairman and B. Ushkov**
- ✓ Semiconducting Chalcogenide Glass II, R. Fairman and B. Ushkov
- ✓ Semiconducting Chalcogenide Glass III, R. Fairman and B. Ushkov
- ✓ Glassy Semiconductors, Z. U. Borisoba
- ✓ The physics of amorphous solids, R. Zallen



What else do I need to add?



- ✓ Glass is difficult to be theorized. So is chalcogenide glass.
 - Explanation is usually qualitative, so it looks clumsy.
- ✓ Chalcogenide glass is like a chameleon.
 - Views are different.
- ✓ No recently published well-organized textbook so far.
 - ChG is developing very fast.
 - Debates in many aspects.