Welcome to 3.091

Lecture 21

October 30, 2009

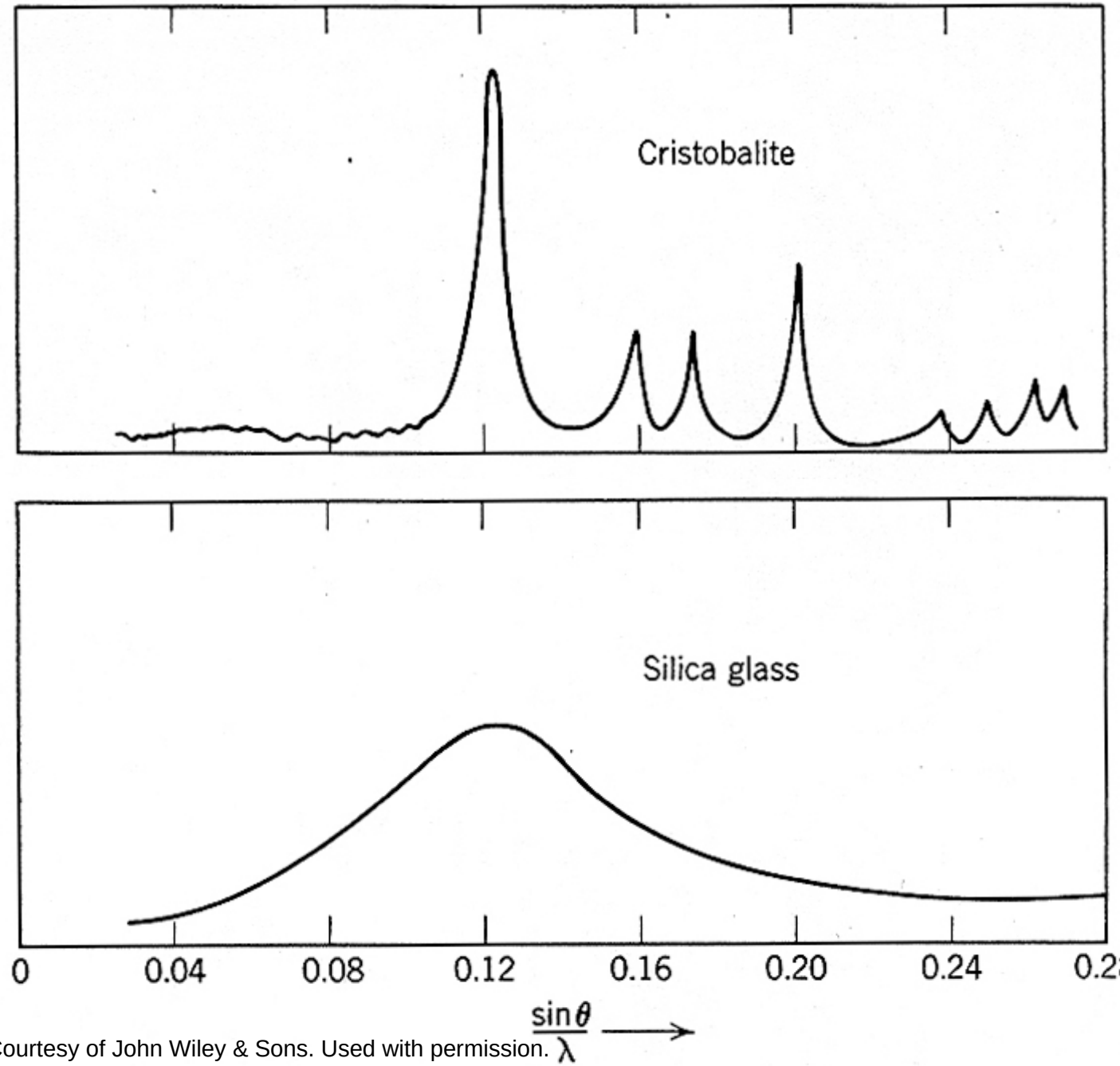
Introduction to Glasses

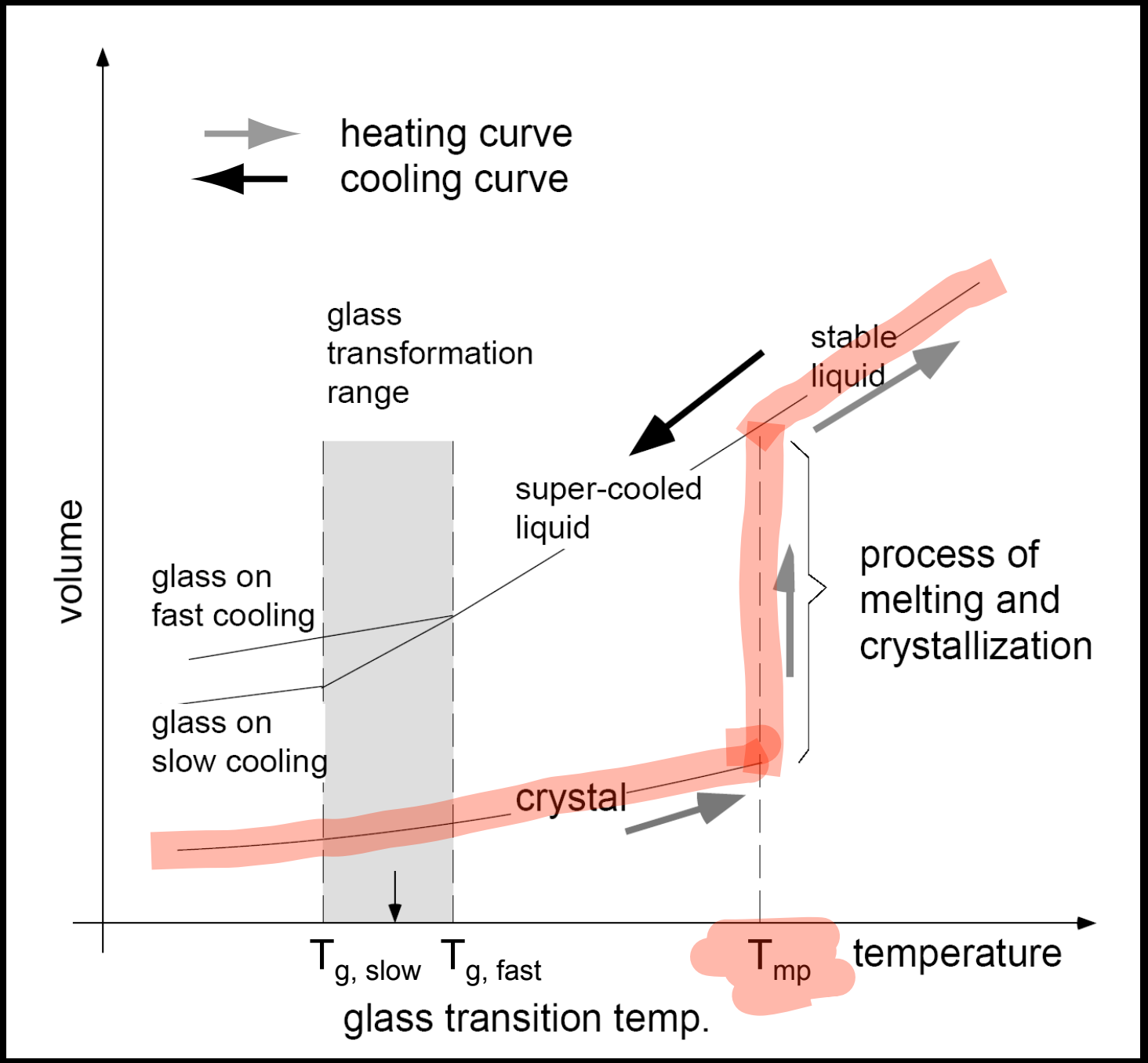
solid: that which is dimensionally stable, i.e., has a volume of its own

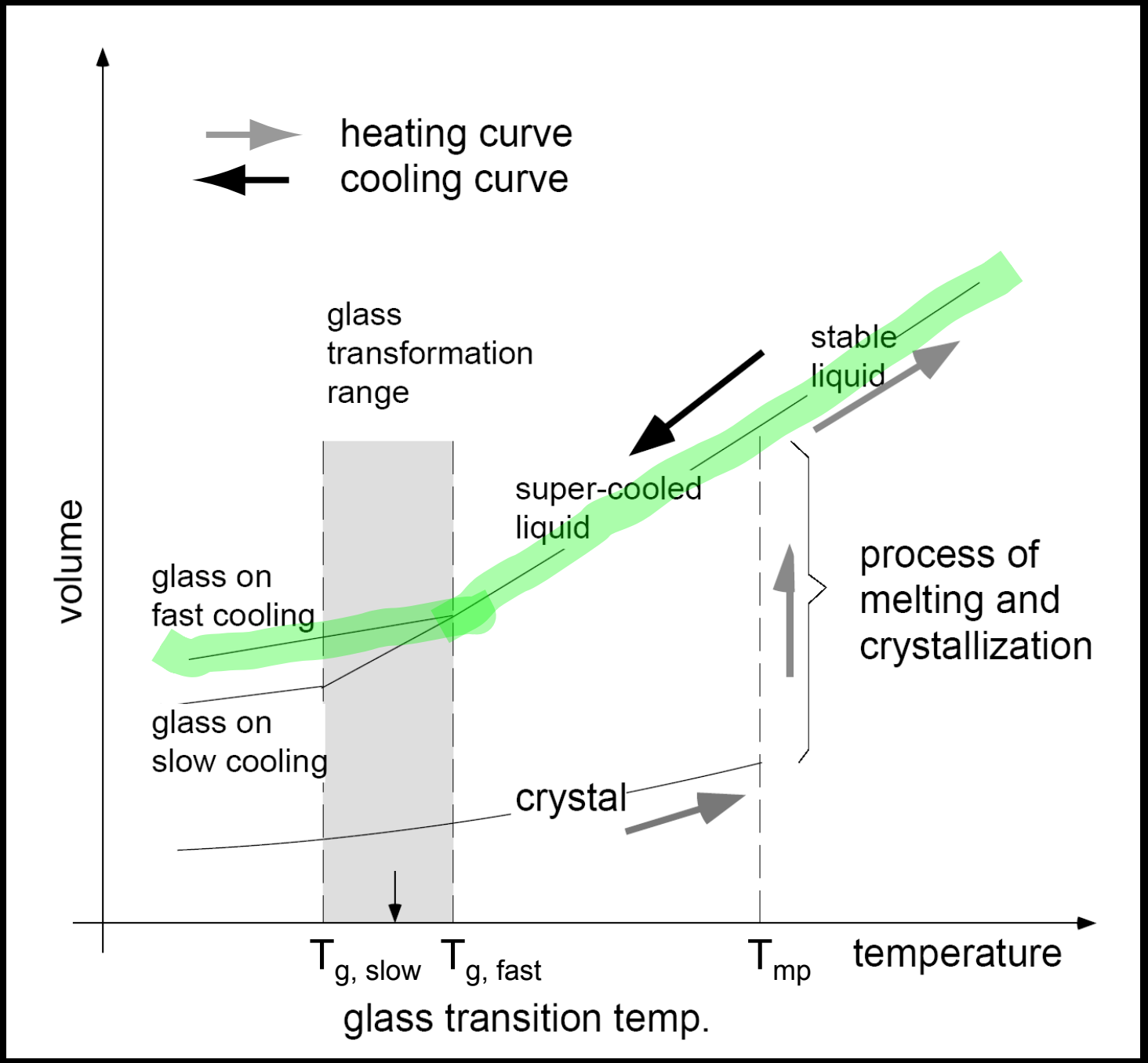
❷ classifications of solids by atomic arrangement

	ordered	*disordered*
atomic arrangement	regular	random*
order	long-range	short-range*
name	crystalline	amorphous
	"crystal"	"glass"

glass: solid lacking long-range order




heating curve
cooling curve
glass
transformation
range
stable
liquid
super-cooled
liquid
process of
melting and
crystallization
glass on
fast cooling
glass on
slow cooling
crystal
volume
$T_{g,\ slow}$
$T_{g,\ fast}$
T_{mp}
temperature
glass transition temp.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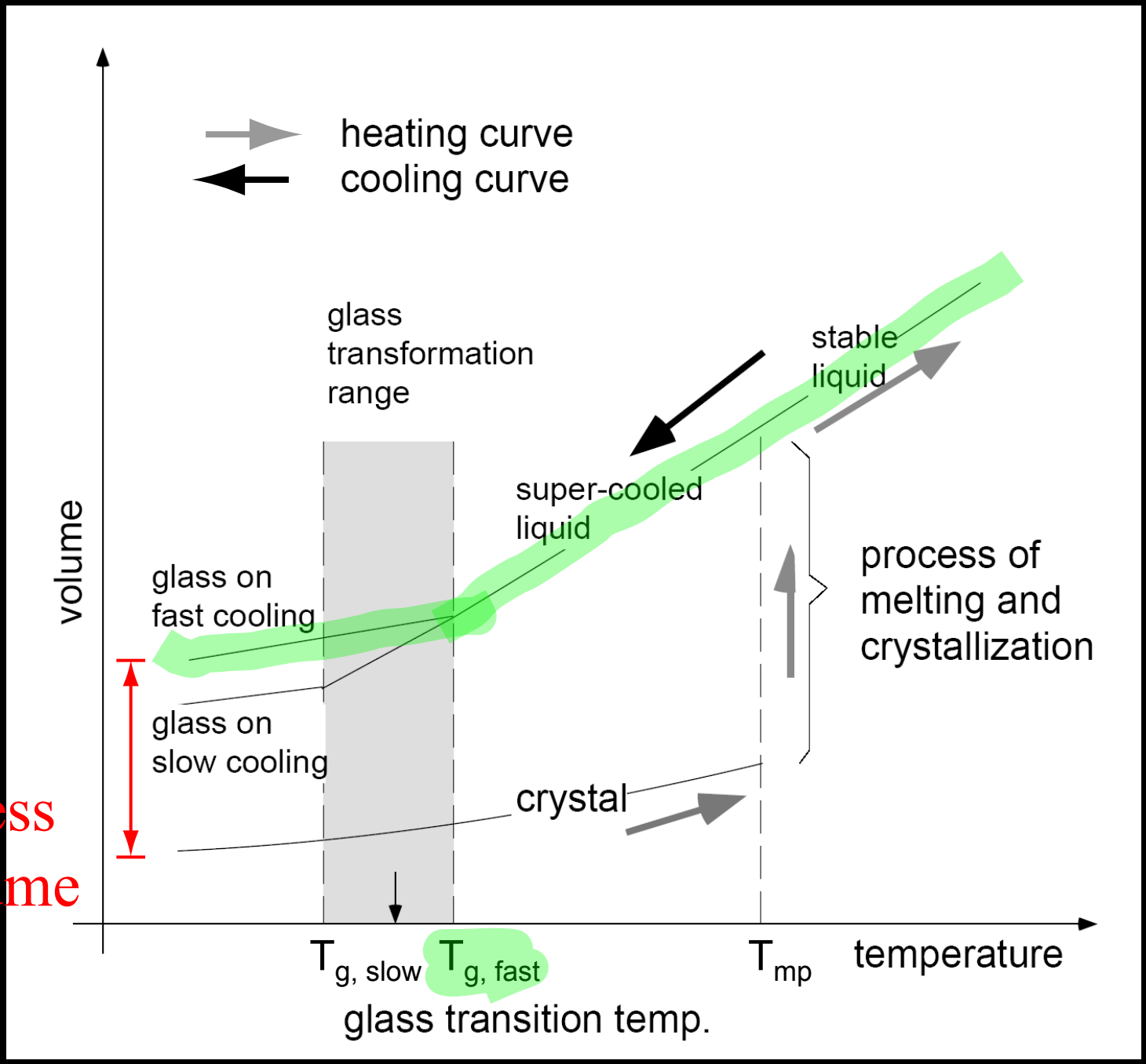
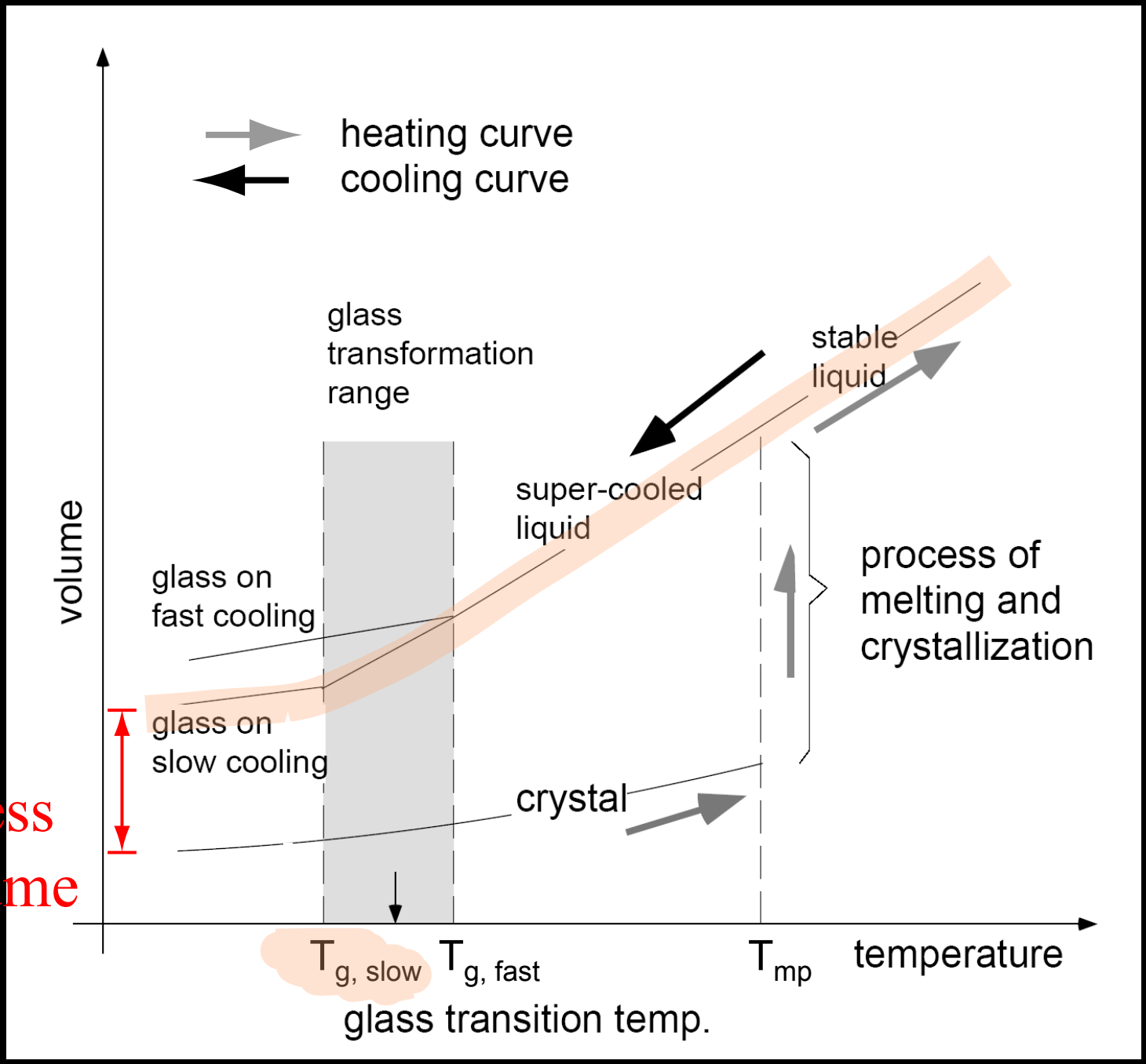


V^{xs}
excess
volume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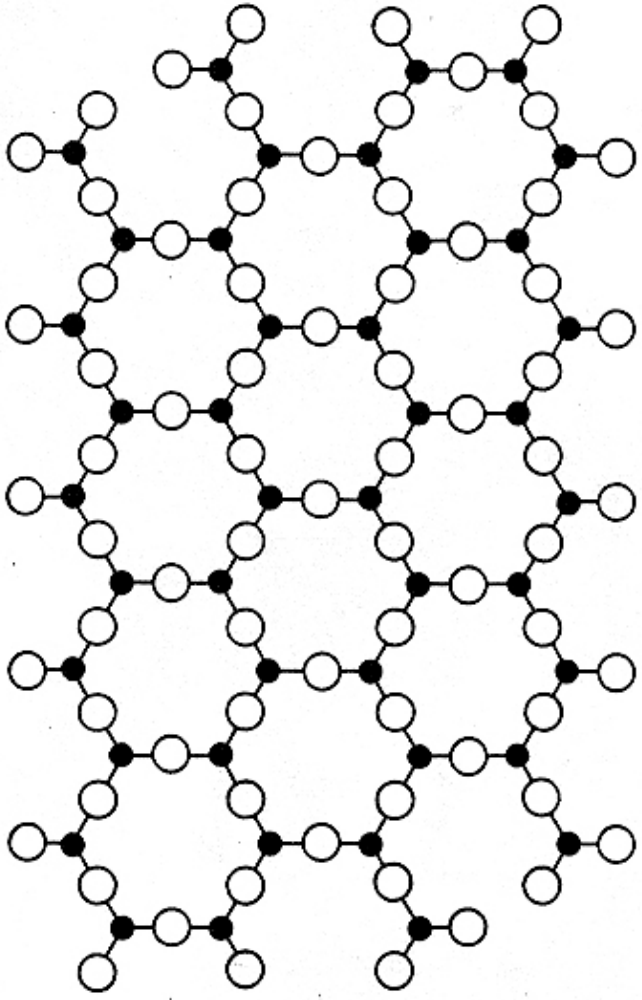
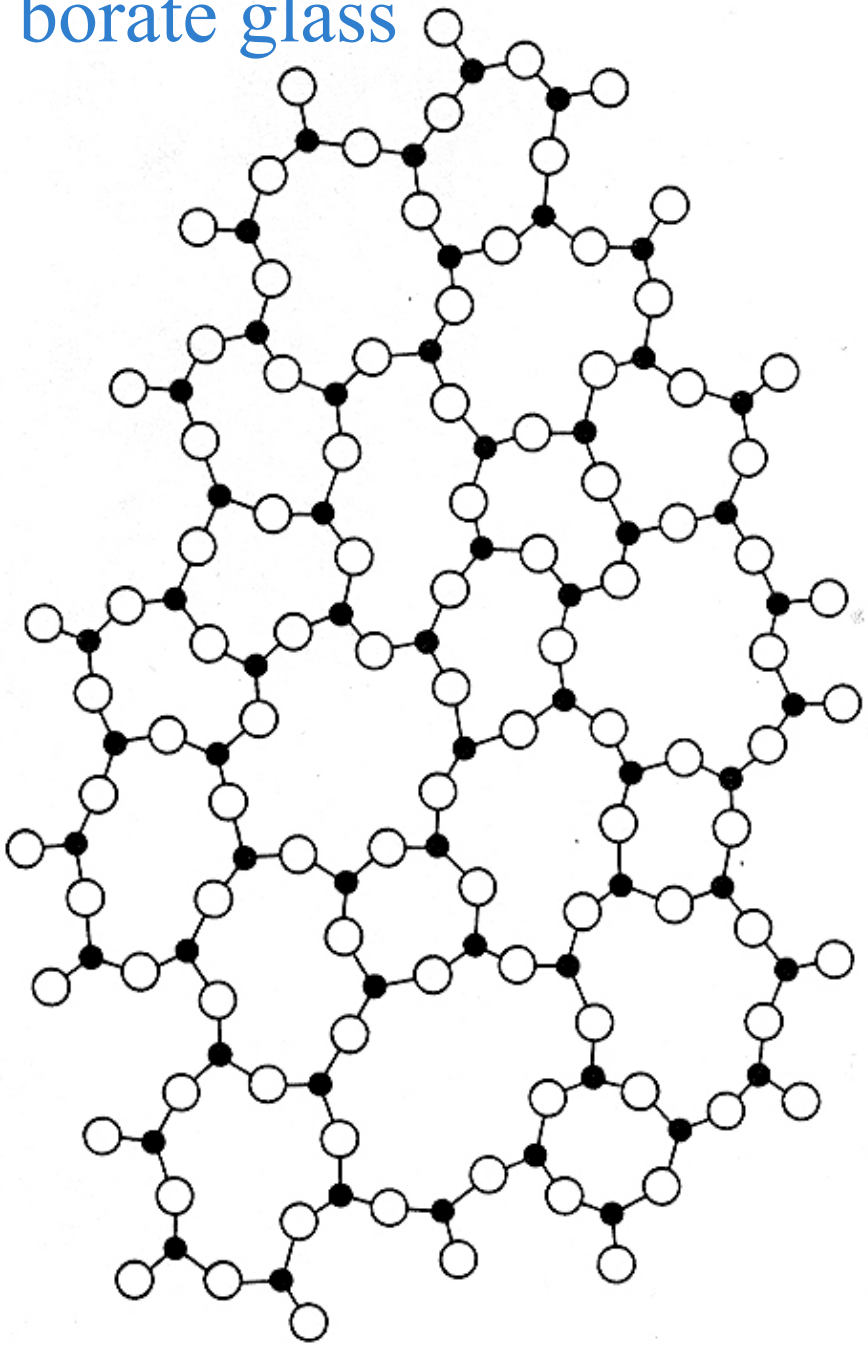
B_2O_3 (crystal)



borate glass



Properties of Oxide Glasses

1. *chemically* inert
2. *electrically* insulating
3. *mechanically* brittle
4. *optically* transparent

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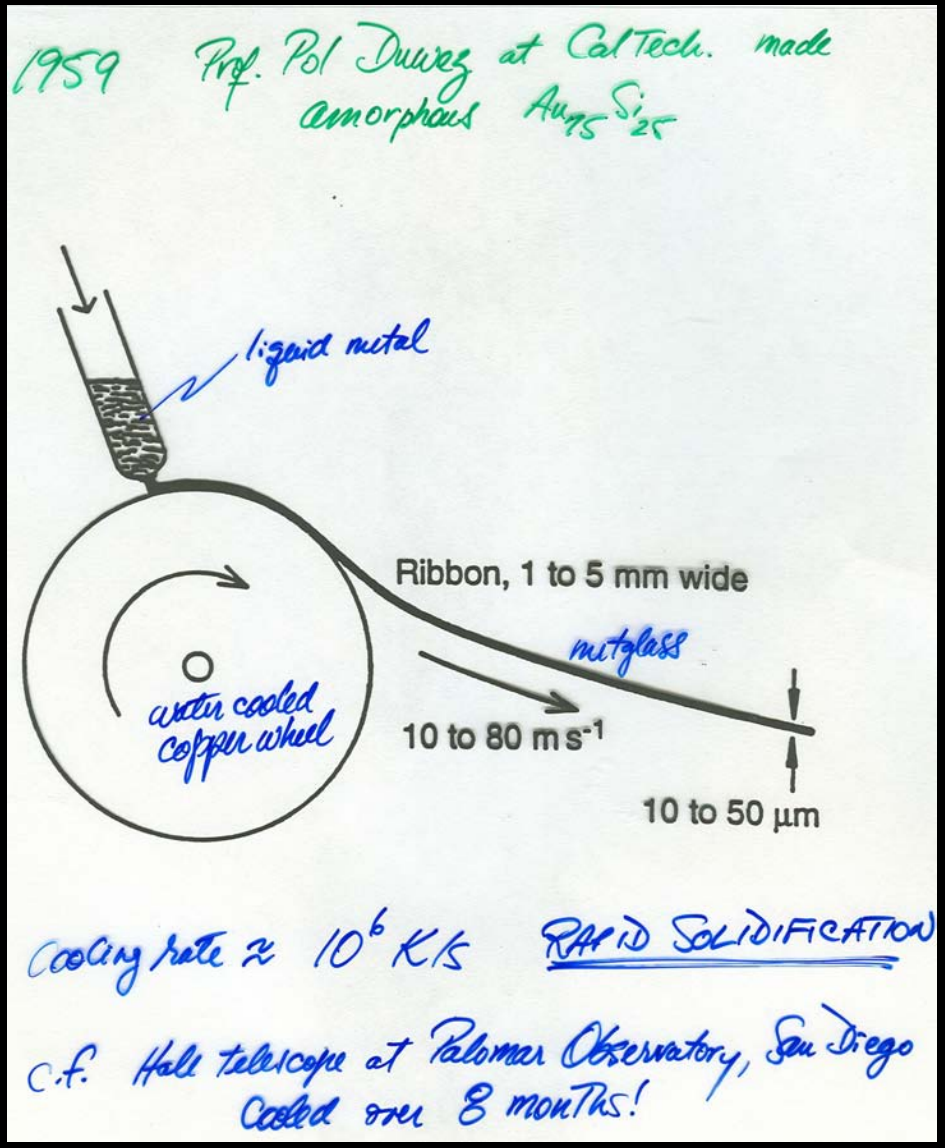
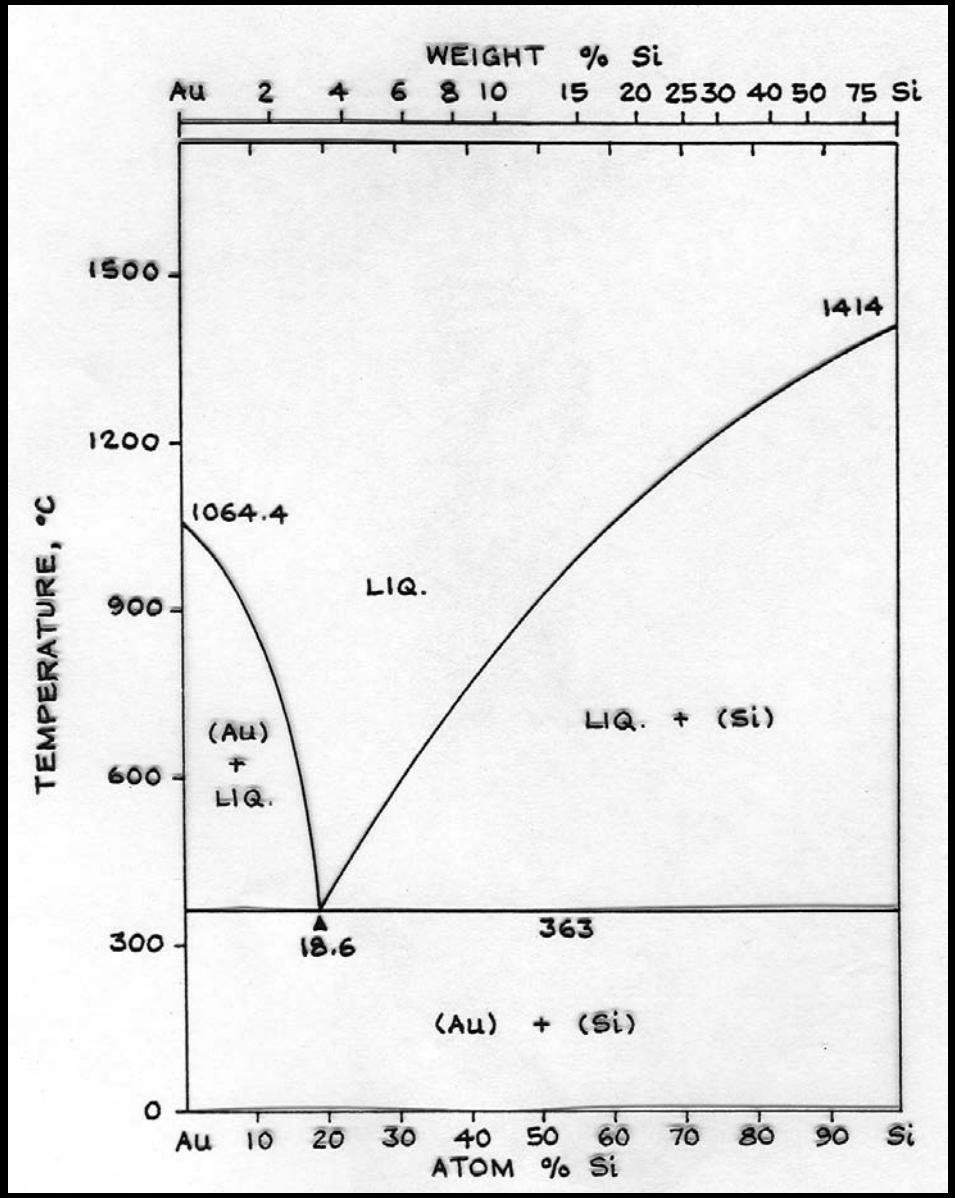
☞ **high melting** ☹

Metallic Glasses



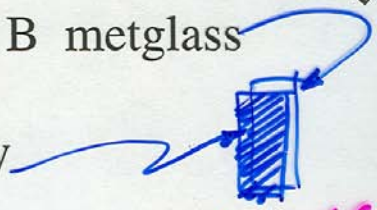
Au-Si Phase Diagram



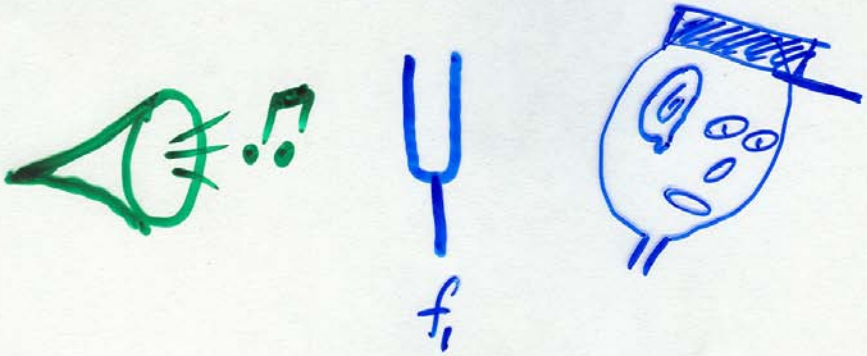
Magnetoelastic Resonators: Theft Prevention

resonator: 39 Fe, 39 Ni, 2 Mo, 20 B metglass

bias magnet: FeCoCr ductile alloy



Sets metglas at field to give max. magel. coupling.



(1) pulse excitation signal & listen for resonance (merchandise)

(2) operated excitation continuously & listen for harmonics (library books, videos, not mag. el. coupling.

3.091SC Introduction to Solid State Chemistry

Fall 2009