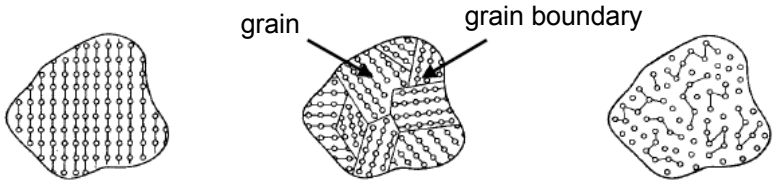
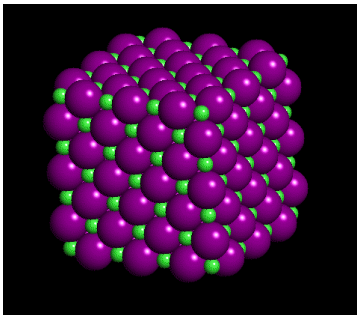
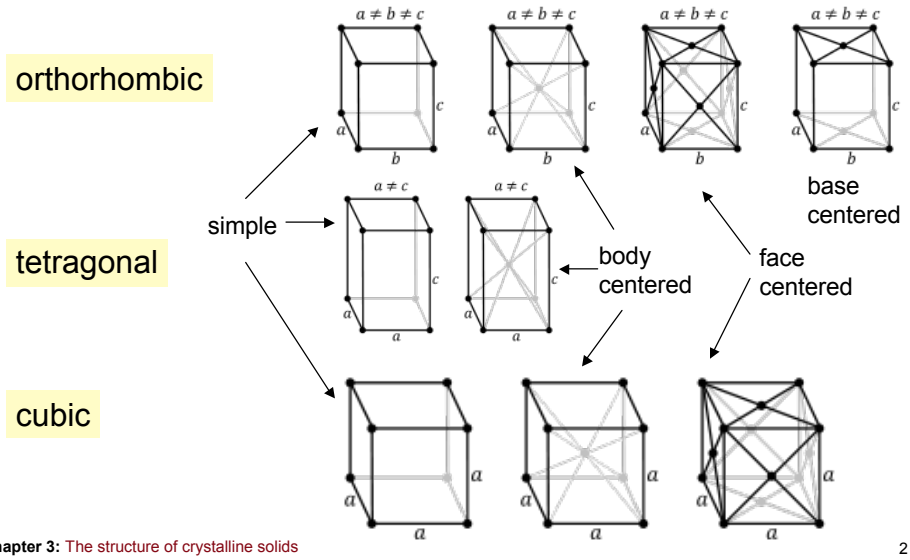
Structure of solids



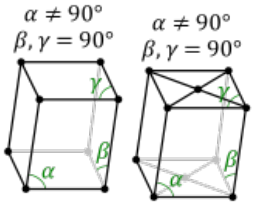
Atomic arrangement in solids



The 14 Bravais lattices

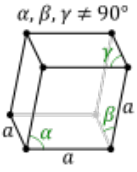


The 14 Bravais lattices

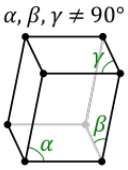


monoclinic

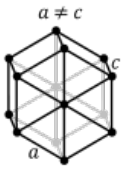
base centered



trigonal

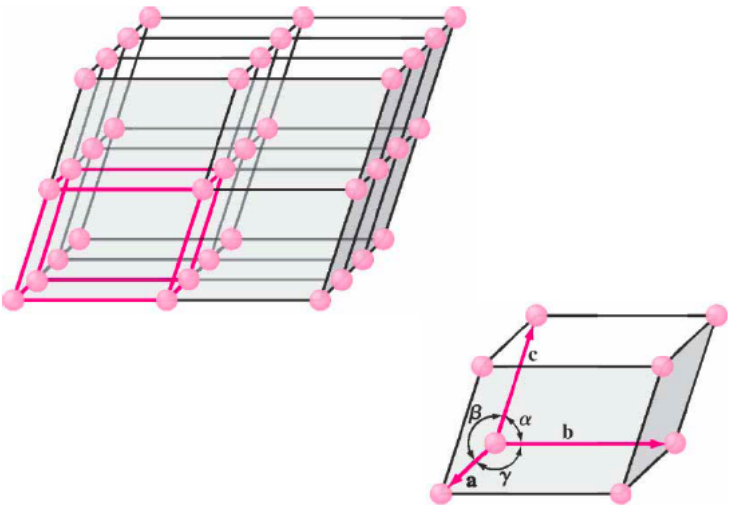


rhombehedral

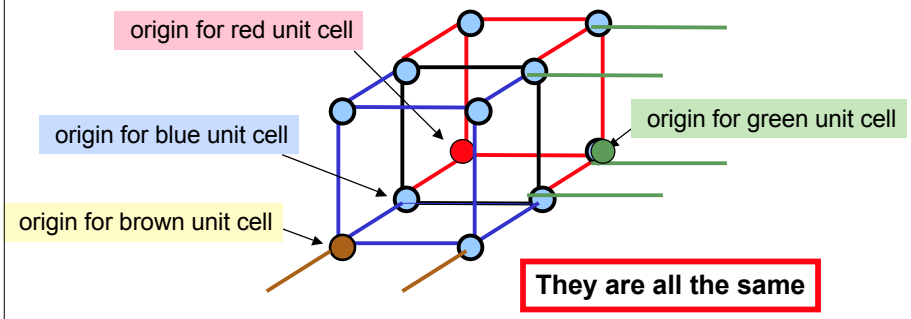


hexagonal

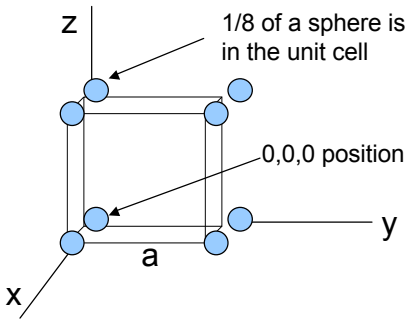
Unit cells

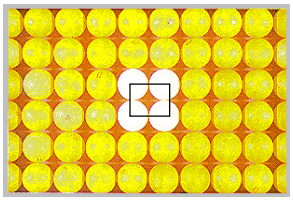


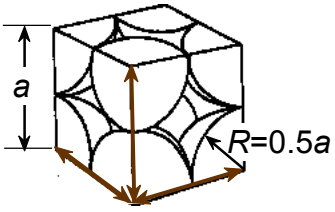
Arbitrary labeling of origin

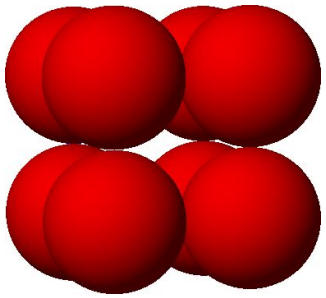


Common unit cells - simple cubic

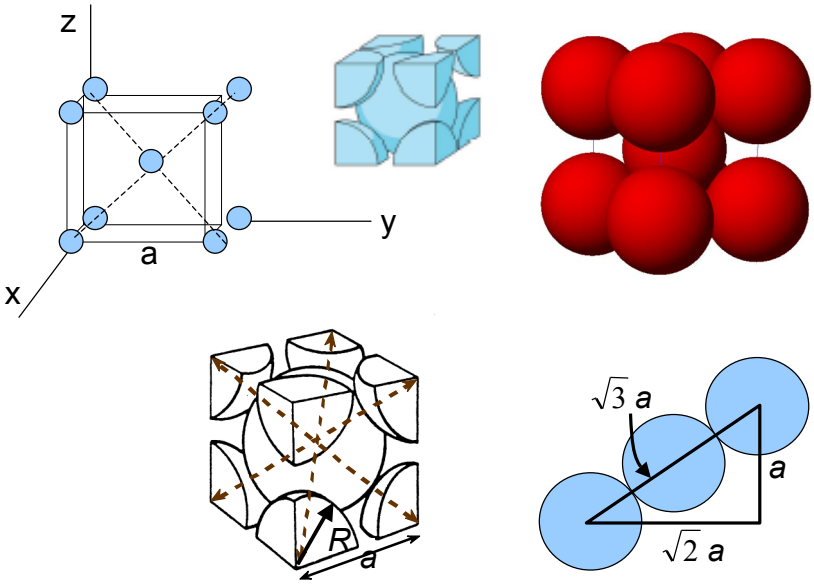




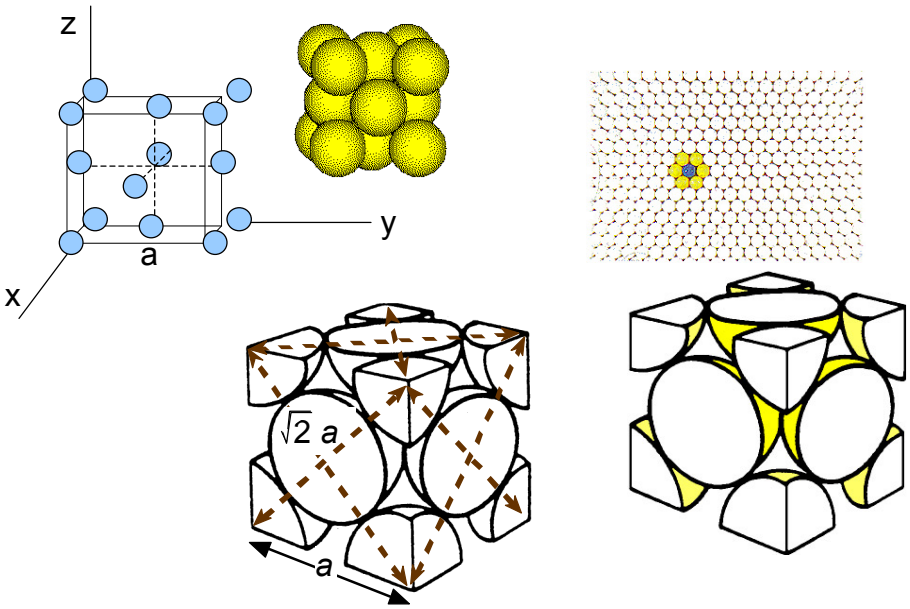




Body centered cubic (BCC)

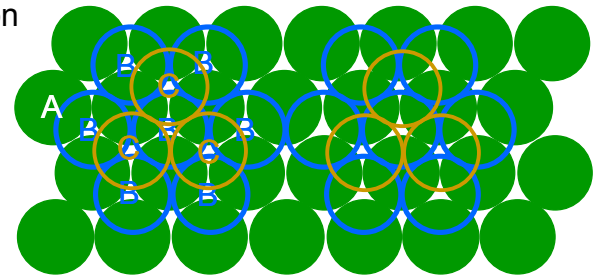


Face centered cubic (FCC)

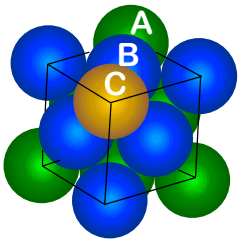


FCC stacking sequence

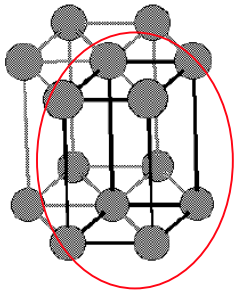
- ABCABC... Stacking Sequence
- 2D Projection

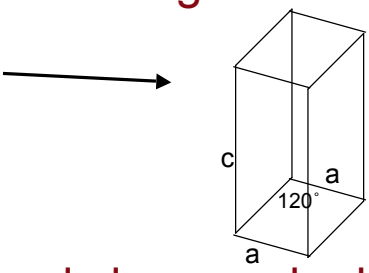


- FCC Unit Cell

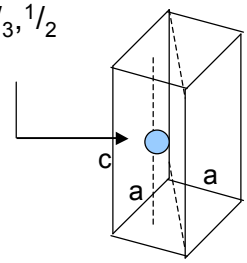


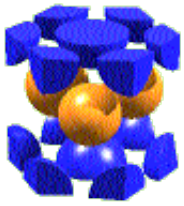
Hexagonal



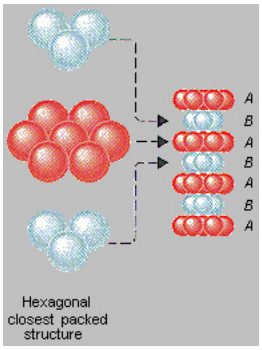


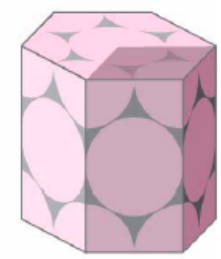
Hexagonal close packed (HCP)

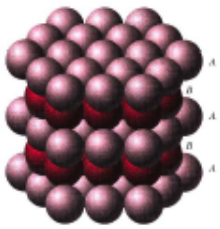




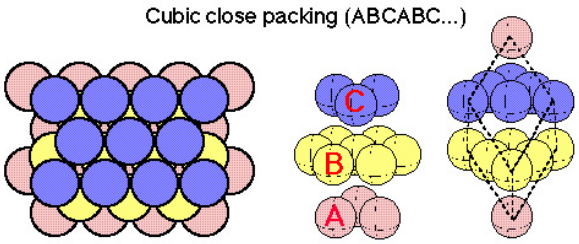
HCP stacking sequence

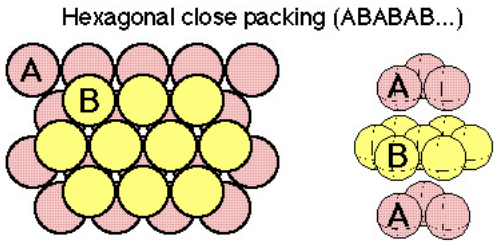




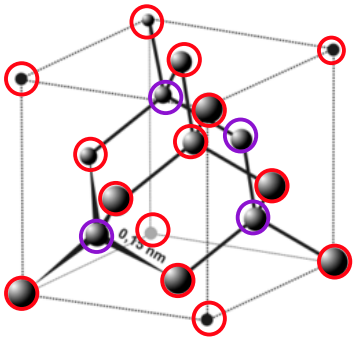


Comparison between the two close packed structures: FCC and HCP

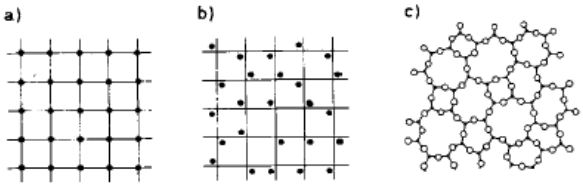




Diamond structure

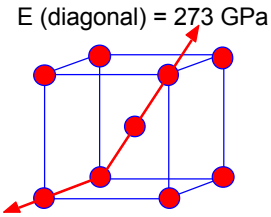


Amorphous solids - glasses

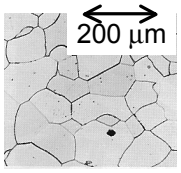


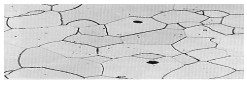
Single vs Polycrystals

- Single Crystals
  -Properties vary with direction: anisotropic.

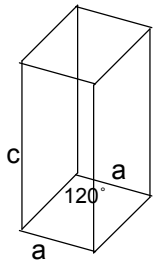


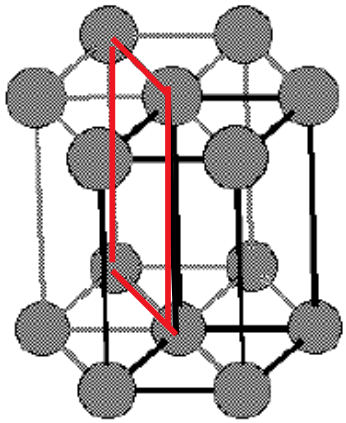
- Polycrystals



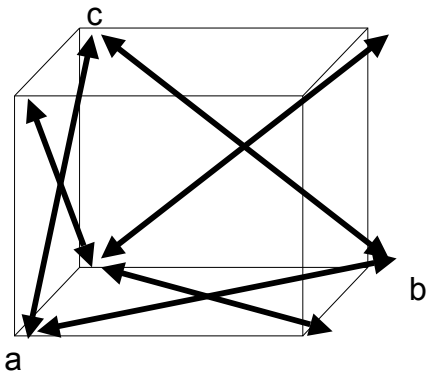


Directions in hexagonal unit cells

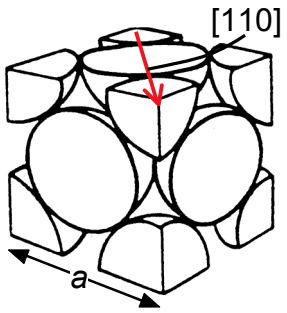




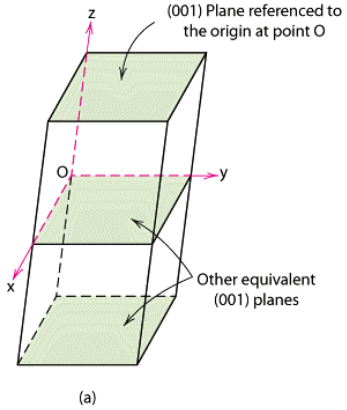
Family of directions



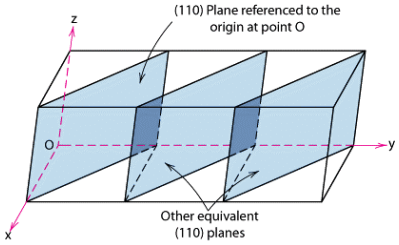
Linear Density



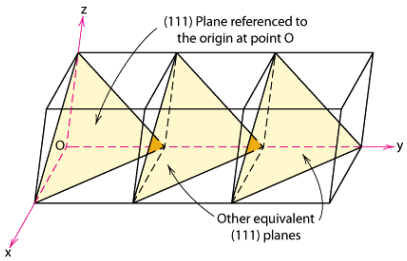
Crystallographic planes



(a)



(b)



(c)

Crystallographic planes demo

Indexing crystallographic planes

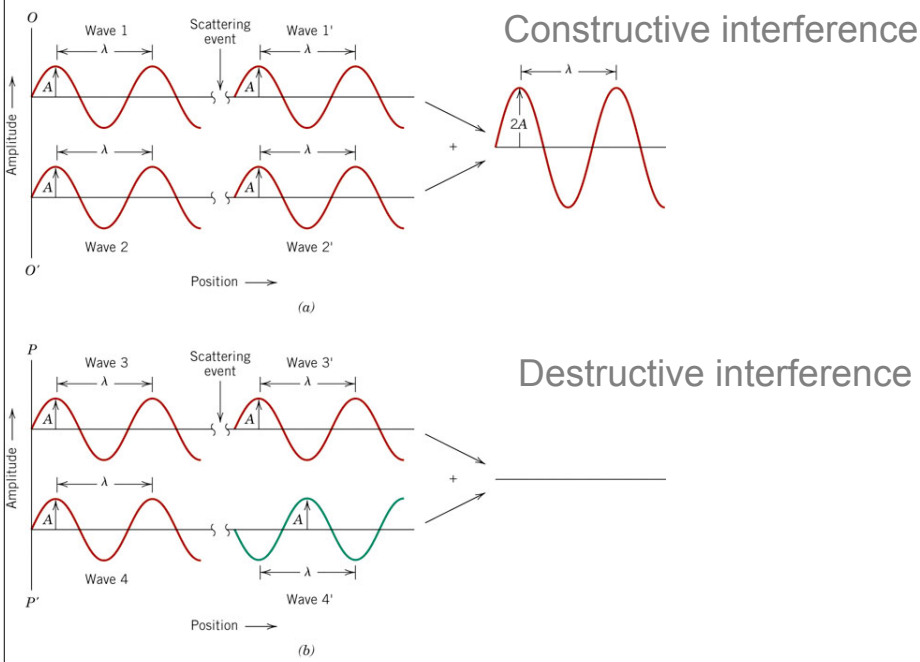
http://www.doitpoms.ac.uk/tlplib/miller_indices/lattice_index.php

Identifying crystallographic planes demo

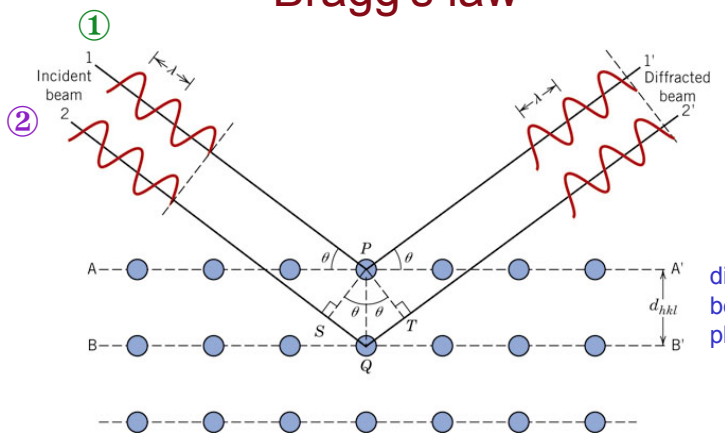
http://www.doitpoms.ac.uk/tlplib/miller_indices/questions.php

Family of planes demo

http://www.doitpoms.ac.uk/tlplib/miller_indices/lattice.php

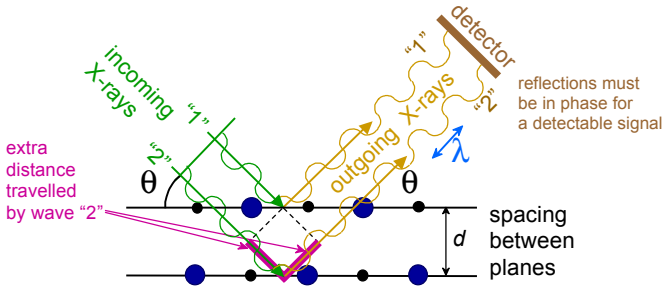


Bragg's law

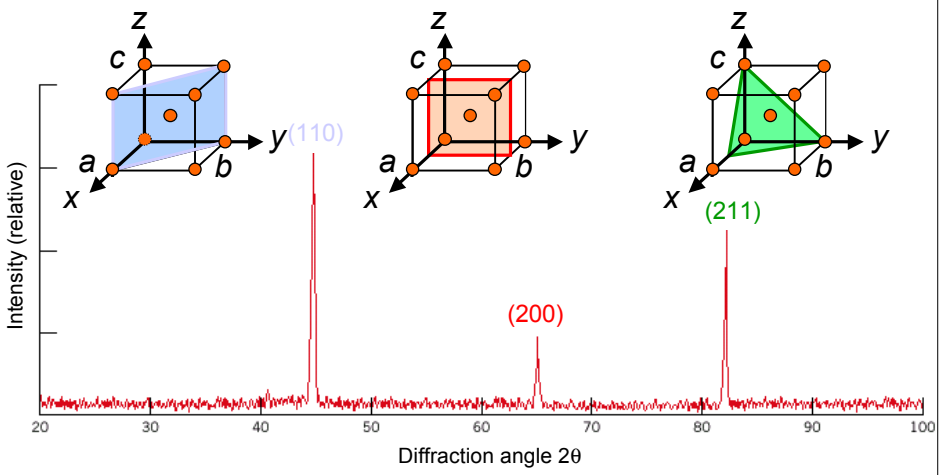


distance between (hkl) planes

X-Rays to determine crystal structure

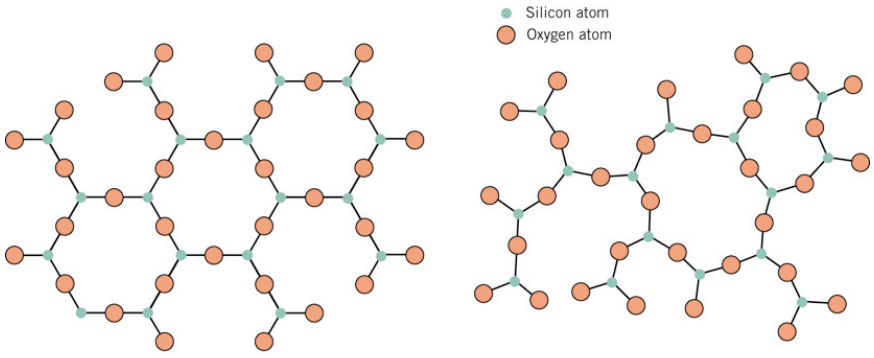


X-Ray diffraction pattern



Diffraction pattern for polycrystalline α-iron (BCC)

Non-crystalline solids



Crystalline SiO_2 Amorphous SiO_2