061011 Quiz 3 X-ray Diffraction

This week we discussed Synchrotron radiation briefly (Doug Kohls lecture) and Stereographic projections including the Wulff Net and Pole Figures.

1) What are the advantages of synchrotron radiation over a lab x-ray source? (at least 4)

2) [100] indicates the direction 100 (u,v,w). What do (100), {100} and <100> refer to?

3) What are the 3 reference frames (coordinate systems) of importance to the study of orientation of crystals in an x-ray diffraction measurement?

4) Sketch and describe how a Wulff Net is constructed. Which reference frames are related in a Wulff Net?

5) Sketch and describe how a Pole Figure is constructed. Which reference frames are related in a Pole Figure.

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1) Synchrotron radiation is collimated, coherent, usually monochromatic and of much higher brilliance compared to a lab source. The synchrotron beam can deliver extremely high fluxes in a small area (typically a 20 micron beam for instance).

2) (100) indicates the plane whose Miller indicies are h=1 k = 0 l = 0. {100} refers to the family of planes and <100> refers to all directions of the type [100], [100],[010] & [001] for a cubic system.

3) a) Crystallographic Frame. b) Sample Frame Machine direction/Transverse Direction/Normal direction. c) Laboratory Frame of Reverence, NS EW.

4) The Wulff Net relates the Lab frame to the crystallographic frame.

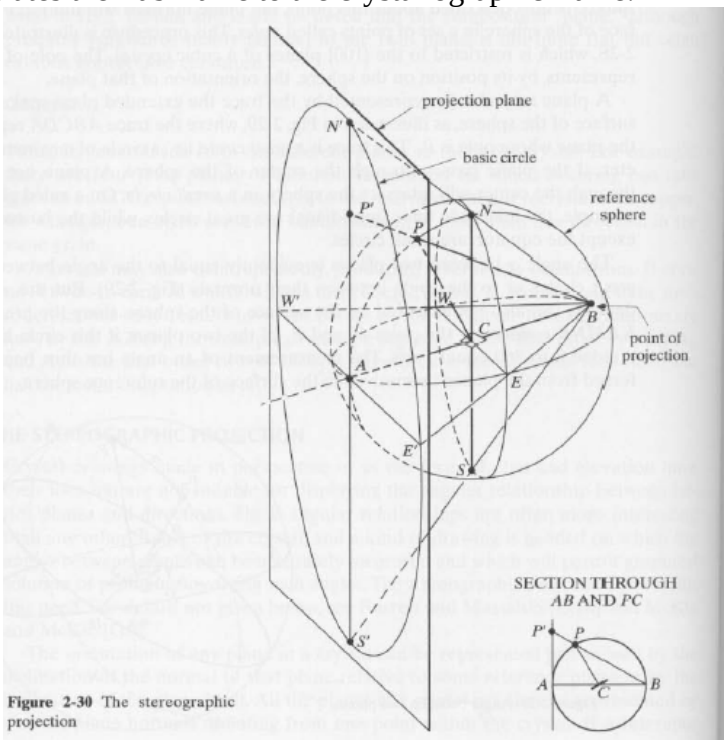

Figure 2-30 The stereographic projection

5) A pole figure relates the sample frame to the crystallographic frame.