NanoLab Study Guide:

Structure of Crystals and Crystal Surfaces

(Reference Materials on NanoLab WWW site including the Crystal Model Lab)

Define the abbreviations sc, fcc, bcc, and hcp.

Which two structures are close-packed?

Which structure is synonymous with ccp?

Which two structures arise from a simple stacking of balls.

How many close-packed planes exist in fcc crystals? in hcp crystals? (We consider all parallel planes to be equivalent.)

Define Miller index.

What is the Miller index for the plane that intersects the x, y, z axes at (a/∞, a/3, a)?

What is the Miller index for the plane that intersects the x, y, z axes at (2a, –4a, 3a)?

Give 3 examples of a low index crystal faces. (Use the Miller indices.)

How is a negative Miller index designated? The non standard and not preferred way is shown in this example: (1 –2 1), what is the standard and preferred way?

Define the different meanings of the Miller indices notation:
(hkl), {hkl},[hkl], and <hkl>.

Give the vector normal to the (132) plane.

For low index surfaces of an fcc crystal.

Give the Miller index of the surface which is a close packed plane.
Give the Miller index for surface which is a square array.
Give the Miller index for surface has rows of atoms

Define coordination number.

What is the coordination number of an atom in the flowing structures?
fcc, bcc, hcp

For an fcc crystal; what is the coordination number of a surface atom on each of the three surfaces, {1 0 0}, {1 1 0}, and {1 1 1}.

Surface sites:

Define: hollow site (3-fold and 4-fold), bridging site, atop.

Define adatom.

Name that crystal surface:

A) Which of the following fcc crystal surfaces are low index faces?
B) For the low index faces, give the Miller index of that face.