

Electron Diffraction and Imaging

Assignment – 11 (solution)

1. Which radiation will have the smallest radius for Ewald sphere?
 - a. X-Ray
 - b. Light
 - c. Electron
 - d. Gamma rays
2. The extinction condition for face centred orthorhombic lattice is
 - a. All h, k, l values are permissible
 - b. Summation of $h+k+l$ should be even
 - c. h, k, l values should be mixed
 - d. h, k, l values should be unmixed
3. What is the Laue condition for diffraction?
 - a. $\Delta k \cdot a = \text{integer}$
 - b. $\Delta k \cdot b = \text{integer}$
 - c. $\Delta k \cdot c = \text{integer}$
 - d. All of the above
4. Select the correct statement,
 - a. Reciprocal lattice vector is in the direction of plane normal and its magnitude is inversely proportional to inter-planar spacing
 - b. Reciprocal lattice vector is perpendicular to the plane normal and its magnitude is inversely proportional to inter-planar spacing
 - c. Reciprocal lattice vector is in the direction of plane normal and its magnitude is directly proportional to inter-planar spacing
 - d. Reciprocal lattice vector is perpendicular to the plane normal and its magnitude is directly proportional to inter-planar spacing
5. The Dark Field image in STEM is obtained by
 - a. The exclusion of the undiffracted central electron beam
 - b. Choosing a specific diffracted beam using objective aperture.
 - c. Precession of the electron beam
 - d. Interference of the central beam and the scattered beam
6. The -3 symmetry is present in which direction for BCC crystal?
 - a. $[100]$
 - b. $[111]$
 - c. $[110]$
 - d. $[121]$

7. The chromatic aberration in case of field emission gun is less than that of Tungsten filament because of

- a. Less energy spread
- b. Less operating temperature
- c. Less work function
- d. small crossover size

8. The contrast in amorphous material is due to

- a. Mass thickness contrast
- b. Diffraction contrast
- c. Atomic number contrast
- d. Phase contrast

9. The divergent beam of incident electrons inside the sample is useful for

- a. Crystal structure determination
- b. Selected area diffraction
- c. Kikuchi diffraction
- d. Dark field imaging

10. Choose the incorrect statements for STEM

- a. Images are not affected by the imaging lens aberration.
- b. Magnification is determined by the focal length of the objective lens
- c. The beam must scanning parallel to optic axis.
- d. Resolution of STEM depends upon the probe size.

11. For obtaining diffraction pattern from specific area of sample in TEM, SAD aperture is inserted

- a. Above the imaging plane of objective lens
- b. In the imaging plane of objective lens
- c. In the back focal plane of objective lens
- d. Between the sample and the objective lens

12. The Viewing screen in TEM is coated with

- a. Ag
- b. AgBr
- c. ZnS
- d. All the above

13. If we increase the magnification of the lenses between the objective lens and the viewing screen, then for a specific diffraction vector g ,

- a. The magnitude will increase and the direction of g will change
- b. The magnitude will decrease and the direction of g will change

- c. The magnitude will Increase and the direction of g will not change
- d. The magnitude and direction of g will not change

14. The incoherent electron beam for Kikuchi diffraction is generated in the sample by

- a. Ionisation of core electrons by incident beam
- b. Plasmon losses of incident beam
- c. Rutherford scattering of incident beam
- d. Phonon scattering of incident beam

15. The CCD camera for recording the diffraction patterns in TEM should be at the

- a. image plane of projector lens
- b. back focal plane of projector lens
- c. the plane of the viewing screen
- d. anywhere in the column