

Electron Diffraction and Imaging

Assignment – 10 (solution)

1. What is a hologram?

- a. Diffraction pattern formed by mixing reference wave with waves passing through the sample
- b. Interference pattern formed by mixing reference wave with waves passing through the sample
- c. Diffraction pattern formed by mixing scattered wave with waves passing through the sample
- d. Interference pattern formed by mixing waves scattered in different directions in the sample

2. HAADF images are formed due to

- a. Coherent inelastic scattering
- b. Incoherent inelastic scattering
- c. Coherent elastic scattering
- d. Incoherent elastic scattering

3. Select the correct statement,

- a. HAADF images cannot be used to differentiate between atoms with one atomic number difference.
- b. HAADF images are used to find out the chemical identity of elements in the sample
- c. HAADF images are used to find out the chemical state of elements in the sample
- d. HAADF images cannot be used to interpret neither the atom type and nor the position

4. The objective lens in STEM is used to

- a. Magnify the image of the gun on the surface of the specimen
- b. Magnify the image of the specimen on the projector screen
- c. De-magnify the image of the gun on the surface of the specimen
- d. De-magnify the image of the specimen on the projector screen

5. The contrast appears in the STEM is due to

- a. Diffraction contrast
- b. Mass thickness contrast
- c. Phase contrast
- d. None of these

6. Select the correct statement,

- a. WDS has much better spectral resolution than EDS
- b. EDS uses diffraction on a crystal to separate spectral components
- c. One chemical element is analysed at a time in EDS
- d. Peaks due to artefacts like sum and escape peak appear in WDS spectrum

7. Which signal is used in EDS for analysis,

- a. Secondary electron
- b. Back scattered electron
- c. Characteristic X-ray
- d. Auger electron

8. Lorentz microscope is used to find out the distribution of

- a. Electric field inside the material
- b. Defects present in the material
- c. Chemically ordered domains in the material
- d. Magnetic domains in the material

9. Select the correct statement,

- a. A hologram contains only amplitude information
- b. A hologram contains only phase information
- c. A hologram contains both amplitude and phase information
- d. A hologram contains neither amplitude nor phase information

10. $K\alpha$ radiation is emitted, when

- a. Electron jump from L-shell to K-shell
- b. Electron jump from M-shell to K-shell
- c. Electron jump from N-shell to K-shell
- d. Electron jump from M-shell to L-shell

11. Energy Filtered Transmission Electron Microscope (EFTEM) could be used

- a. To obtain elemental distribution of only high Z elements in the sample in the image
- b. To obtain elemental distribution of both low and high Z elements in the sample in the image
- c. To remove inelastically scattered electrons from diffraction patterns obtained from the sample
- d. To remove elastically scattered electrons in a specific direction from the image obtained from the sample

12. Resolution in STEM is decided by

- a. The Rayleigh criterion
- b. The spatial resolution of the beam

- c. The image magnification
- d. The size of the features to be imaged