

***** EXAMINATION *****

SCANNING PROBE MICROSCOPIES: SCANNING TUNNELING MICROSCOPY.

1. **As a form changes from single atom to multiple atom to solid, electronic**
 - a) properties change from atomic orbitals to molecular orbitals to band
 - b) properties change from gas to liquid to solid
 - c) properties change from gas to solid to liquid
 - d) None of the above

2. **A band may be filled depending upon**
 - a) the number of electrons
 - b) the density of state
 - c) either a or b
 - d) neither a nor b

3. **A top (partially-)filled band is called**
 - a) a valence band
 - b) a conduction band
 - c) an episode
 - d) None of the above

4. **A bottom empty band is called**
 - a) a valence band
 - b) a conduction band
 - c) an episode
 - d) None of the above

5. **The energy level dividing filled-empty bands is called**
 - a) the Fermi level
 - b) the DOS level
 - c) the conduction band
 - d) the valence band

6. **Workfunction varies between**
 - a) materials and gases
 - b) materials and liquids
 - c) materials and crystal faces
 - d) All of the above

7. **Workfunction is sensitive to**
- a) adsorbates
 - b) external electric fields
 - c) reconstruction
 - d) All of the above
8. **Instrumentation for scanning tunneling microscopy includes sharp tips**
- a) produced by mechanical cutting
 - b) produced by ion beam milling
 - c) produced by electrochemical etching
 - d) Any of the above
9. **The two operating modes for scanning tunneling microscopy are**
- a) constant height and constant current
 - b) constant height and variable current
 - c) variable height and constant current
 - d) variable height and variable current
10. **The constant height mode is**
- a) fast but only works for flat samples
 - b) fast but only works for rough surfaces
 - c) slower but works for flat samples
 - d) slower but works for rough surfaces
11. **The constant current mode is**
- a) fast but only works for flat samples
 - b) fast but only works for rough surfaces
 - c) slower but works for flat samples
 - d) slower but works for rough surfaces
12. **The constant current mode is**
- a) more common than the constant height mode
 - b) less common than the constant height mode
 - c) simpler to operate than the constant height mode
 - d) harder to operate than the constant height mode
13. **Dragging is a method of**
- a) changing the area of a solid
 - b) changing the volume of a gas
 - c) moving atoms and molecules on surfaces
 - d) None of the above
14. **Scanning tunneling spectroscopy may give information about**
- a) the most complex atoms of a molecule
 - b) the most simple atoms of a molecule
 - c) the average atom of a molecule
 - d) None of the above

15. **When the tip of scanning tunneling spectroscopy is biased negative**
- a) you get information about empty electronic states near the surface
 - b) you get information about empty electronic states on the surface
 - c) you get information about filled electronic states near the surface
 - d) you get information about filled electronic states on the surface
16. **During magnetic force microscopy, data is collected at different**
- a) tip-surface phases in non-contact and far non-contact mode
 - b) tip-surface temperature in non-contact and far non-contact mode
 - c) tip-surface states in non-contact and far non-contact mode
 - d) tip-surface separations in non-contact and far non-contact mode
17. **Using lateral force microscopy to get information about friction is**
- a) tribology
 - b) embrionics
 - c) phasing
 - d) twisting
18. **Sharper tips for atomic force microscopy can be made by**
- a) diamond milling
 - b) chrome milling
 - c) ion beam milling
 - d) Any of the above
19. **Related atomic force microscopy techniques can measure**
- a) hydrophobicity
 - b) magnetism
 - c) friction
 - d) All of the above
20. **Atomic force microscopy**
- a) is limited to conducting samples
 - b) provides true topographic imaging
 - c) is not sensitive to vibration
 - d) All of the above

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