Assignment 11

Due on 2020-04-15, 05:59 IST.

1. Of the following, the couple which is NOT magic number for atoms to form resonances/solates is (3 points)
   A. 2
   B. 6
   C. 14
   D. 16
   E. 32

No, the grader is incorrect. Answer: D 16

Accepted Answers:

2. Two photon absorption cross-section per atom is (3 points)
   - increased greatly with size for nanoclusters
   - decreases slowly with size for nanoclusters
   - has similar slope for nanoclusters and nanoparticles
   - increases linearly with size for nanoparticles
   - decreases linearly with size for nanoparticles

No, the grader is incorrect. Answer: A increased greatly with size for nanoclusters

Accepted Answers: A increased greatly with size for nanoclusters

3. Transient absorption experiments on metal nanoclusters reveal charge transfer (time constant) of (3 points)
   - 1 ps for LH04 LUMO
   - 1 ps for core state
   - 1 ns for LH04 LUMO
   - 1 ns for core state
   - 1 ns for core state

No, the grader is incorrect. Answer: A 1 ps for LH04 LUMO

Accepted Answers: A 1 ps for LH04 LUMO

4. Assignment of the lowest energy band in the absorption spectrum of semiconductor nanocrystals is (3 points)
   - $E_g = E_0 (0)$
   - $E_g = E_0 (0)$
   - $E_g = E_0 (0)$
   - $E_g = E_0 (0)$
   - $E_g = E_0 (0)$

No, the grader is incorrect. Answer: D $E_g = E_0 (0)$

Accepted Answers: D $E_g = E_0 (0)$

5. The 0.75 ps component observed in the experiment of Weaks and colleagues is assigned to (3 points)
   - photon-photon coupling
   - electron-phonon coupling
   - electron-electron coupling
   - electron-photon coupling
   - electron-electron coupling

No, the grader is incorrect. Answer: B electron-phonon coupling

Accepted Answers: B electron-phonon coupling

6. Gold nanoclusters are associated with (3 points)
   - surface plasmon resonance
   - bulk exciton resonance
   - localized exciton resonance
   - surface electron transition
   - bulk electron transition

No, the grader is incorrect. Answer: A surface plasmon resonance

Accepted Answers: A surface plasmon resonance

7. The 108 ps component in Au nanocluster is assigned to (3 points)
   - charge delocalization
   - $S_0 \rightarrow S_1$ transition
   - $S_0 \rightarrow S_1$ transition
   - charge localization
   - $S_0 \rightarrow S_1$ transition

No, the grader is incorrect. Answer: D charge localization

Accepted Answers: D charge localization

8. $S_0 \rightarrow S_1$ transition (3 points)

Accepted Answers: 

9. Size-dependence of colour of semiconductor nanocrystals is observed where (3 points)
   - their radii of the nanoclusters are comparable to the radius of the nanocluster
   - their radii of the nanoclusters are extremely less
   - their radii of the nanoclusters are extremely large
   - their radii of the nanoclusters are comparable to the size of the particle
   - their radii of the nanoclusters are comparable to the radius of the nanocluster

No, the grader is incorrect. Answer: E their radii of the nanoclusters are comparable to the radius of the nanocluster

Accepted Answers: E their radii of the nanoclusters are comparable to the radius of the nanocluster

10. Long lifetimes observed for large semiconductor nanocrystals originate by considering (3 points)
   - density of surface trap states
   - semiconductor nature
   - interaction of core exciton with other excitons
   - density of surface trap states
   - interaction of core exciton with other excitons

No, the grader is incorrect. Answer: D density of surface trap states

Accepted Answers: D density of surface trap states

11. Kekulé, Fulcher and coworkers proposed (3 points)
   - involvement of a single trap state
   - involvement of more than two trap states
   - involvement of more than one trap states
   - less efficient hopping for higher pump energies
   - more efficient hopping for higher pump energies

No, the grader is incorrect. Answer: C involvement of more than one trap states

Accepted Answers: C involvement of more than one trap states