

Unit 4 - Week-3

Course outline

How does an NPTEL online course work?

Week 1

Week 2

Week-3

- Lec 01-Plasmons- II
- Lec 02-Plasmons- III
- Lec 03-Plasmons- IV
- Lec 04-Plasmons- V
- Lec 05-Plasmons- VI

Quiz : Assignment 3

Solution of Assignment 3

Week-4

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Weekly Feedback

Assignment 3

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2020-02-19, 23:59 IST.

1) Wave vector of a Surface Plasmon Wave traveling along a metal dielectric interface is given by _____. 1 point

$\sqrt{\frac{\epsilon_s \epsilon_m}{\epsilon_s + \epsilon_m}}$

$\sqrt{\frac{\epsilon_s}{\epsilon_s + 2\epsilon_m}}$

$\sqrt{\frac{\epsilon_m}{\epsilon_s + \epsilon_m}}$

$\sqrt{\frac{\epsilon_s \epsilon_m}{\epsilon_s + 2\epsilon_m}}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$\sqrt{\frac{\epsilon_s \epsilon_m}{\epsilon_s + \epsilon_m}}$

2) For a metal dielectric interface calculate the real part of wave vector of SP wave along the interface where the dielectric function of metal is -11.75 and of dielectric medium is 2.25. 1 point

- 1.668
- 1.353
- 1.227
- 1.555

No, the answer is incorrect.

Score: 0

Accepted Answers:

1.668

3) There are two sets of metal dielectric interface. For both the sets, real parts of dielectric functions of metal are the same but the imaginary part of set 1 is half of set 2. If the propagation length of SP wave is L for set 1, what will be the propagation length for SP wave for set 2. 1 point

- 1.5L
- 2.5L
- 0.5L
- 2L

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.5L

4) For gold-air interface, calculate the propagation length of SP wave for 633nm wavelength of light if the dielectric function of air is 1 and for gold $\epsilon = -11.753 + i1.2596$ 1 point

- 15.34 nm
- 16.28 nm
- 25.21 nm
- 13.42 nm

No, the answer is incorrect.

Score: 0

Accepted Answers:

15.34 nm

5) For the excitation of localized surface plasmons, the frequency of the incident light should be _____ to the oscillation frequency of conduction electrons of metal nanoparticle. 1 point

- Greater
- Lesser
- Equal
- Does not depend

No, the answer is incorrect.

Score: 0

Accepted Answers:

Equal

6) The extinction cross section of a small particle is defined by one of the following relation, which is _____. 1 point

- $4\pi k \text{Im}(\alpha)$
- $k \text{Im}(\alpha)$
- $(3/2)\pi k \text{Im}(\alpha)$
- $k^2 \text{Im}(\alpha)$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$4\pi k \text{Im}(\alpha)$

7) For a metal sheet if the volume of it is doubled what will be the effect on the plasma frequency of the metal sheet. 1 point

- Becomes double
- Becomes half
- Becomes infinity
- No effect

No, the answer is incorrect.

Score: 0

Accepted Answers:

No effect

8) Which of the given molecules is IR active in nature? 1 point

- CO
- CO₂
- O₂
- NH₃

No, the answer is incorrect.

Score: 0

Accepted Answers:

CO₂

9) For three layer structure of successive thickness of the layers are d1, d2,d3,and refractive indices n1, n2, n3, if the angle of incidence and transmittance are θ_1 and θ_2 for first interface for light beam of wavelength λ , what will be the phase shift introduced by second layer? 1 point

$\frac{2\pi d_2}{\lambda} \sqrt{\epsilon_2 - n_2^2 \sin^2 \theta_2}$

$\frac{2\pi}{\lambda} \sqrt{\epsilon_2 - n_2^2 \sin^2 \theta_2}$

$\frac{2\pi d_1}{\lambda} \sqrt{1 - n_2^2 \sin^2 \theta_2}$

$\frac{2\pi d_1}{\lambda} \sqrt{n_1^2 - n_2^2 \cos^2 \theta_2}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$\frac{2\pi d_2}{\lambda} \sqrt{\epsilon_2 - n_2^2 \sin^2 \theta_2}$

10) If a light beam is incident on one face of a right angle prism (n=1.45) at an angle 30 degree with the normal, what will be the corresponding angle at the bottom of the prism- air interface. 1 point

- 27.82
- 25.37
- 24.82
- 24.04

No, the answer is incorrect.

Score: 0

Accepted Answers:

24.82