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NPTEL

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Courses » Surface Engineering for Corrosion and Wear Resistance Application

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Unit 12 - Week 10 :

Register for Certification exam

Course outline

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- Lecture 45 : Physical Vapur Deposition(PVD)
- Lecture 46 : Sputtering
- Lecture 47 : Chemical Vapor Deposition(CVD)

Assignment 10

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment. **Due on 2019-04-10, 23:59 IST.**

1) Thin film coating by physical vapor deposition (PVD) is amenable to: ***1 point***

- a. Only elemental metals
- b. Only pure metals or metallic alloys
- c. Only pure metals, alloys and intermetallic compounds
- d. Pure metals, alloys, semi-conductors, intermetallic + non-metallic compounds, composites

No, the answer is incorrect.
Score: 0

Accepted Answers:
d. Pure metals, alloys, semi-conductors, intermetallic + non-metallic compounds, composites

2) Among other variables, deposition rate and thickness is principally influenced by the: ***1 point***

- a. Only temperature
- b. Only boiling point
- c. Temperature, boiling point, vapor pressure of the target
- d. Temperature, melting and boiling point, vapor pressure, density and thermal conductivity of the target

No, the answer is incorrect.
Score: 0

Accepted Answers:
c. Temperature, boiling point, vapor pressure of the target

3) For easy thermal deposition, the vapor pressure of the target material: ***1 point***

- a. Should be low
- b. Should be high
- c. Should be lower than atmospheric pressure

a. Atmospheric pressure
b. Greater than atmospheric pressure
c. Vacuum or lower than atmospheric pressure
d. Flowing gas in positive pressure

No, the answer is incorrect.
Score: 0

Accepted Answers:
c. Vacuum or lower than atmospheric pressure

5) Typical thin film deposit thickness aimed or achieved in PVD is: ***1 point***

a. < 0.005 µm
b. < 0.05 µm
c. < 0.5 µm
d. < 5.0 µm

No, the answer is incorrect.
Score: 0

Accepted Answers:
d. < 5.0 µm

6) Identify the method from below which is not a typical PVD technique: ***1 point***

a. Direct current (DC) evaporation
b. Electro-plating
c. Ion plating
d. RF sputtering

No, the answer is incorrect.
Score: 0

Accepted Answers:
b. Electro-plating

7) Name the source from below which is NOT used for PVD: ***1 point***

a. Combustion flame heating
b. Electron beam heating
c. Resistance boat heating
d. Arc source evaporation

No, the answer is incorrect.
Score: 0

Accepted Answers:
a. Combustion flame heating

8) Unit of vapor pressure could be: ***1 point***

a. Pascal
b. Torr
c. mbar
d. All of above

No, the answer is incorrect.
Score: 0

Accepted Answers:

d. All of above

9) PVD is most useful for: ***1 point***

- a. All the below
- b. Tribological application
- c. Aesthetic coating
- d. Semiconductor device fabrication

No, the answer is incorrect.
Score: 0

Accepted Answers:
a. All the below

10) PVD is not effective to improve: ***1 point***

- a. Wear resistance
- b. Corrosion resistance
- c. Oxidation resistance
- d. Coefficient of friction

No, the answer is incorrect.
Score: 0

Accepted Answers:
c. Oxidation resistance

11) For PVD or sputtering, the substrate can be a: ***1 point***

- a. Conductor like metal
- b. Insulator like polymer
- c. Semi-conductor like silicon
- d. All of above

No, the answer is incorrect.
Score: 0

Accepted Answers:
d. All of above

12) Thermally evaporated multiple alternate layers of two dissimilar films of limited thickness is a better option than the same two layers deposited only once one on top of the other making up the entire deposit thickness because the first option: ***1 point***

- a. is very economical
- b. reduces interfacial stress significantly
- c. takes much lower time
- d. consumes much lower quantity of material

No, the answer is incorrect.
Score: 0

Accepted Answers:
b. reduces interfacial stress significantly

13) In sputtering, the target serves as the: ***1 point***

- a. Cathode
- b. Anode
- c. Neutral electrode

d. None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
a. Cathode

14) The substrate-deposit interface is: ***1 point***

a. diffused in PVD but sharp in sputtering
b. sharp in sputtering but diffused in PVD
c. diffused in CVD but sharp in PVD
d. sharp in PVD, CVD or sputtering

No, the answer is incorrect.
Score: 0

Accepted Answers:
d. sharp in PVD, CVD or sputtering

15) Chemical reaction has NO role in: ***1 point***

a. Reactive sputtering
b. Thermal PVD
c. Thermal CVD
d. Plasma enhanced CVD

No, the answer is incorrect.
Score: 0

Accepted Answers:
b. Thermal PVD

16) Which of the following is not amenable to be coated or synthesized by plasma enhanced reactive sputtering? ***1 point***

a. TiN
b. Al_2O_3
c. Diamond like carbon
d. TiO_2

No, the answer is incorrect.
Score: 0

Accepted Answers:
c. Diamond like carbon

17) Non-reactive sputtering is usually conducted at a pressure of: ***1 point***

a. 0.001 – 0.1 Pa
b. 0.01 – 1.0 Pa
c. 0.1 – 10.0 Pa
d. 1.0 – 100 Pa

No, the answer is incorrect.
Score: 0

Accepted Answers:
c. 0.1 – 10.0 Pa

18) Identify the method that produces the highest deposition rate: ***1 point***

a. Tungsten boat evaporation

b. Electron beam thermal evaporation

c. DC magnetron sputtering

d. Cathodic arc deposition

No, the answer is incorrect.
Score: 0

Accepted Answers:
d. Cathodic arc deposition

19) In ion plating, the process involves: ***1 point***

a. Thermal evaporation followed by ionization within plasma and deposition as neutral atoms

b. Sputtering followed ionization in plasma and deposition by implantation

c. Sputtering followed by chemical reaction and deposition as neutral atoms

d. Evaporation followed by acceleration and implantation as ions

No, the answer is incorrect.
Score: 0

Accepted Answers:
a. Thermal evaporation followed by ionization within plasma and deposition as neutral atoms

20) The plasma in ion plating helps in: ***1 point***

a. Sputtering the target for deposition

b. Sputtering the substrate for deposition

c. Sputtering the substrate for surface cleaning

d. Sputtering the target for chemical reaction

No, the answer is incorrect.
Score: 0

Accepted Answers:
c. Sputtering the substrate for surface cleaning

21) Which is NOT true for CVD? ***1 point***

a. Chemical reaction occurs at the substrate surface

b. Multiple precursor in vapor state is needed

c. Substrate or chamber is heated

d. Target and deposit composition are the same

No, the answer is incorrect.
Score: 0

Accepted Answers:
d. Target and deposit composition are the same

22) Which of the following thin film deposition process will emit by-product or waste? ***1 point***

a. Deposition by PVD

b. Deposition by CVD

c. Deposition by reactive sputtering

d. Deposition by ion plating

No, the answer is incorrect.
Score: 0

Accepted Answers:

b. Deposition by CVD

23) The main difference between synthetic diamond and diamond like coating (DLC) lies in: ***1 point***

- a. Hardness and density of the deposit
- b. Temperature and rate of deposition
- c. Absence of sp^3 bonding in DLC
- d. Presence of sp^2 bonding in synthetic diamond

No, the answer is incorrect.
Score: 0

Accepted Answers:
c. Absence of sp^3 bonding in DLC

24) Multi-layer coating by sputtering is possible by: ***1 point***

- a. Changing the target
- b. Changing the plasma
- c. Changing the applied potential difference
- d. Changing the anode and cathode

No, the answer is incorrect.
Score: 0

Accepted Answers:
a. Changing the target

25) The most effective way to improve the coating-substrate adhesion in PVD is by: ***1 point***

- a. Increasing the deposit thickness
- b. Heating the substrate
- c. Raising the applied potential difference
- d. Increasing the ion density

No, the answer is incorrect.
Score: 0

Accepted Answers:
b. Heating the substrate

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