METALLIC COATINGS

Surface coating made by noble metals

Types

hot dipping,

tinning,

galvanizing,

spraying,

cladding

cementation

electroplating

electroless plating, etc.

ELECTROPLATING /ELECTRO DEPOSITION OF GOLD

Def.:

process of depositing the coating metal on the base metal by passing electric current through an electrolytic solution containing the soluble salt of the coating metal.

base metal to be plated –cathode

the coating metal or good electrical conducting inert material- an anode.

Objectives of Electroplating

i) Increase the corrosion resistances of the base metal.

ii) Improve the hardness and appearance of the base metal.

iii) Increase the decorative and commercial values of the article.

iv) Improve the surface properties of the metals and non metals.

v) Protect the metal from chemical attack.

PRINCIPLE

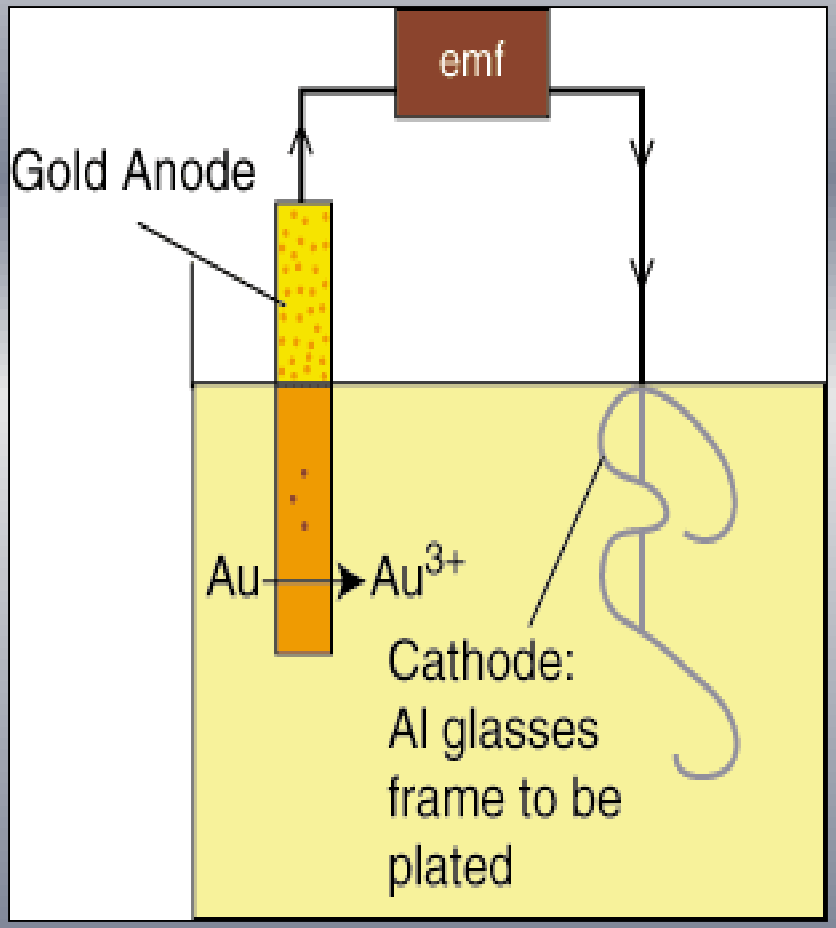
❖The anode = coating metal & the metal to be coated = cathode.

The soluble salt of coating metal = electrolyte.

When direct current is passed from the battery, coating metal ions move to words the cathode and get deposited.

Thus, a thin layer of coating metal is obtained on the article.

During the electrolysis, the concentration of electrolyte remains unaltered because the metal ion deposited from the electrolytic solution on the cathode is filled up again.



Pretrement

1. The object to be plated is treated (CCl4, acetone).
2. Followed by dil. HCl or dil. H2SO4.
3. The cleaned article is then an undercoated by Ni and Cr.

Construction

Anode: Gold

Cathode: Metal article to be coated (Cu)

Electrolyte: Gold + KCN

Temperature: 60 o C.

Current density (mA cm-2): 1-10

Process

When the direct current is passed from the battery through the solution, gold dissolves and moves towards the cathode and gets deposited.

Thus, a thin layer of gold is obtained on the article (at cathode).

Sodium thiosulphate or gelatin is used as additives.

Reactios

Ionization: AuCl3 ionizes as

$$\mathbf{AuCl_3 \longrightarrow Au^{3+} + 3Cl^-}$$

At Cathode On passing current, Au3+ ions get deposited on the Cu object

$$\mathbf{Au^{3+} + 3e^- \longrightarrow Au}$$

At Anode The free Cl- ions move to anode & dissolves Au to form $AuCl_3$.

$$\mathbf{Au + 3Cl^- \longrightarrow AuCl_3}$$

Thus, a continuous formation of electrolyte during electrolysis.

Characteristics of gold Plating

i) Gives high quality decorations.
ii) Provides high oxidation resistant to the metallic objects.
iii) The thickness of the coating ranges from 0.05 – 0.1 microns.

Applications

1.Used for electrical and electronic applications.
2. Used for high quality decorations and high oxidation resistant coatings
3. Usually for ornamental jewels, a very thin gold coating (about 1x10-4 cm) is given.




Learning Outcome:

Familiarize about the Corrosion and its type.
Experience sharing day-today problems of corrosion