Gold Electroplating

Preparation of Gold solution for electroplating:

1. Add 200 ml of DI water in beaker & heat at 100 % power.
2. Take 1 gm of 99.99% Potassium auro-cyanide powder and add to hot water. Increase the stirring knob.
3. After stirring for some time add DI water to get 800 ml solution.
4. Allow solution to reach a temperature of 70-80 ° C

To set DC power supply as Constant Current source

Power ⇒Display limit ⇒ make current zero & Voltage = 20 V

⇒ press O/P ON/OFF⇒ set current to 0.005 A.

Calculation of thickness:

Atomic weight of Au = 196.96

We have,

Current, I = $\frac{Q}{t}$

According to Faradays law of electrochemistry,

Weight of deposited Gold, W is

$$W = K \times Q$$

Where, k is constant, given by

$$K = \frac{Atomic\ weight\ of\ Au}{no.of\ electrons for\ one\ coloumb\ of\ Au\ deposited\ on\ cathode \times \text{Faraday constant(F)}}$$

1 mole of Au deposited in one hour

$\therefore$ I = $\frac{1}{3600}$ =0.27 mA

Therefore, current density =0.27 mA /cm^2

For 2” wafer

Current density =$\frac{22}{7}$ X 0.27 X $(2.5)^2$ = 0.005 mA /cm^2

Thickness of deposited Au film (T)

T = $\frac{W\ X\ 10000}{Density\ X\ Area}$ in μm

T = $\frac{0.005\ X\ 3600\ X\ 197\ X10000}{19.3\ X\ \frac{22}{7}\ X\ (2.5)^2 X3XF}$

F = 6.023E23 X 1.602E-19= 96.488

T = 300 μm/hr

Therefore, 1 μm Au deposited in 4 hours for a 2” wafer.