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• Consulting • Training • Expert Witness • Failure Analysis • Design Review • Corrosion Test • Modeling • Coatings • Materials • Cathodic Protection

WebCorr Corrosion Consulting Services Presents

Electroplating Technology for the Microelectronics and Semiconductor Industry

Date: As published on website Venue: As published on website

Course Overview

This two-day electroplating course thoroughly and systematically covers the fundamentals and processes of electroplating technology for the microelectronics and semiconductor industry. Participants will learn the fundamentals of electrodeposition processes, the effect of bath variables on the plating quality, the various plating techniques such as DC electroplating, pulse electroplating, electroless plating and immersion plating, and methods for testing, evaluation, and trouble-shooting of electrodeposits.

This electroplating course can be taken as in-house training course, course-on-demand, online course and distance learning course worldwide. It can also be customized to meet the specific needs of your organization.

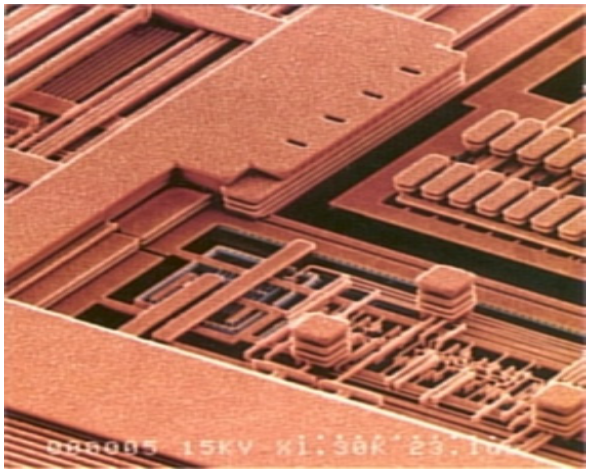
Who Should Attend

Engineers, designers, and QA/QC personnel working in the microelectronics and semiconductor industry.

Course Outline

1.1 Overview of Electroplating Technology in the Microelectronics and Semiconductor Industry
- 1.1.1 Electroplating: An Old Technology with A New Life
- 1.1.2 Electroplating and Copper Metallization
- 1.1.3 The Breakthrough in Electroplating: Superfilling
- 1.1.4 The Dual Damascene Process: the Route to Making Better Chips
- 1.1.5 Effects of Additives on Copper Trench Filling
- 1.1.6 Some Key Issues

1.2 Electroplating: Basic Terms and Concepts
- 1.2.1 Primer on Chemistry
- 1.2.2 Redox Reactions
- 1.2.3 The Electromotive Force (EMF) Series Series
- 1.2.4 Equilibrium Potential, Overpotential and Mixed Potential
- 1.2.5 Effect of Concentration on Potential (Nernst Equation)
- 1.2.6 Anode, Cathode and Cell Potentials
- 1.2.7 Conductivity of Electrolyte



- 1.2.8 Electrolysis and Faraday's Law

1.3 Electroplating: Electrode Kinetics
- 1.3.1 Kinetics of Electrodeposition (Tafel & Butler-Volmer Equation)
- 1.3.2 Polarisation and Mass Transport (Diffusion)
- 1.3.3 The Double Layer
- 1.3.4 Rate-Determining Steps in Electrode Reactions
  - Concentration Overvoltage
  - Charge-Transfer Overpotential
  - Crystallisation Overvoltage
  - Resistance Overvoltage

1.4 Materials That Can Be Electroplated: Understanding the Atomic Structure of Metals and Alloys
- 1.4.1 The Crystalline Nature of Metals
- 1.4.2 Lattice Defects in Metals
- 1.4.3 Grains and Grain Boundaries
- 1.4.4 Lattice Defects in Alloys
- 1.4.5 Effect of Lattice Defects on the Mechanical Property
- 1.4.6 Metals That Can Be Electrodeposited

1.5 Electroplating Processes and Process Control
- 1.5.1 Overview of Electrodeposition
- 1.5.2 Essential Components of a Plating System
- 1.5.3 The Nature of Plating Process
- 1.5.4 Electroplating Electrolytes
- 1.5.5 Mass and Current Relationship
- 1.5.6 Current Efficiency
- 1.5.7 Quality and Throwing Power

Course Outline

1.6 Exercises and Case Studies

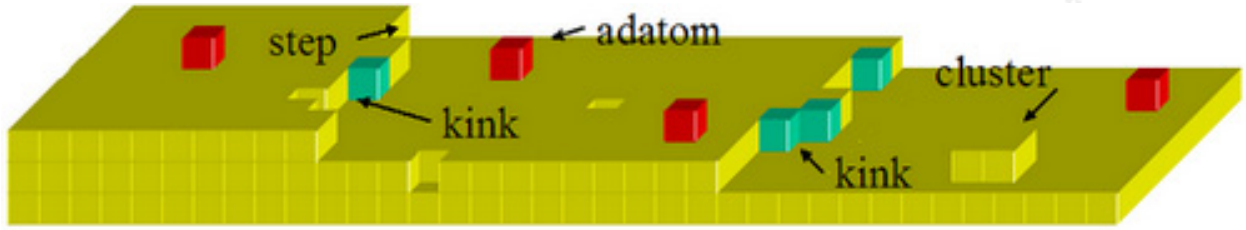
2.1 Electrodeposition Considered at the Atomistic Level
- 2.1.1 Mechanisms of Electrodeposition
- 2.1.2 Electrocrystallisation: Nucleation and Growth of Nuclei
- 2.1.3 Kink Site and Surface Imperfections
- 2.1.4 Overall Phase Growth
- 2.1.5 Effects of Plating Additives on the Structure and Properties of Electrodeposits
- 2.1.6 Other Factors Influencing the Quality of Electrodeposits
- 2.1.7 Thickness and Porosity
- 2.1.8 Whisker Growth

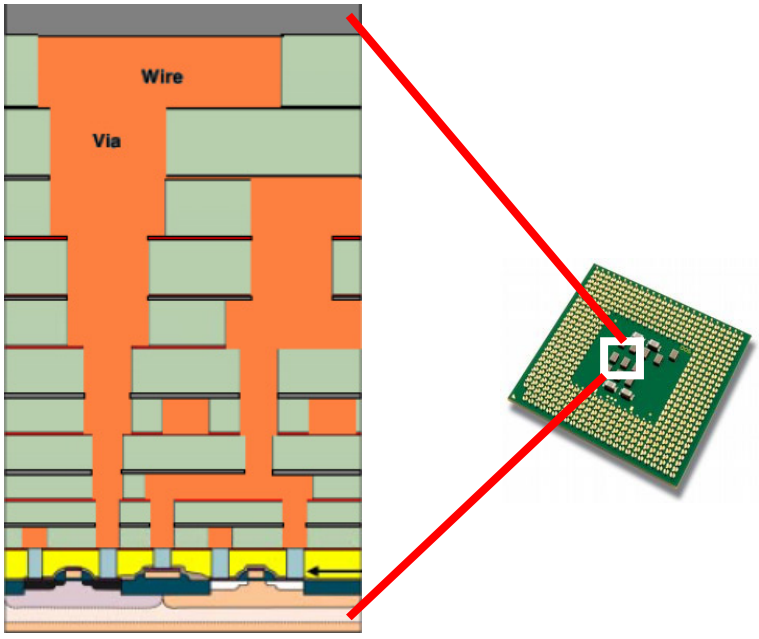
2.2 Different Plating Processes
- 2.2.1 Direct Current Electroplating
- 2.2.2 Pulse Current Electroplating Process
- 2.2.3 Periodic Pulse Reverse Plating Process
- 2.2.4 Effects of Pulse Current, Pulse Shape and Time on the Electrodeposits
- 2.2.5 Laser-induced Plating
- 2.2.6 Comparison of Different Plating Processes

2.3 Electroless Plating and Immersion Plating
- 2.3.1 Fundamentals of Electroless Deposition
- 2.3.2 Composition of Electroless Plating Bath
- 2.3.3 Operating Conditions of Electroless Plating Baths
- 2.3.4 Properties of Electroless Deposits
- 2.3.5 Applications of Electroless Deposition
- 2.3.6 Electroless Deposition of Composites

2.4 Exercises and Case Studies

2.5 Methods for Testing, Evaluation & Trouble-Shooting of Electrodeposits
- 2.5.1 In-situ Observation of Electrodeposition by SPM/STM/SFM
- 2.5.2 DC Potential Measurement
- 2.5.3 DC Polarization Measurement
- 2.5.4 AC Electrochemical Impedance Spectroscopy (EIS)
- 2.5.5 Mass Spectrometric Methods: ISS/SIMS/SNMS
- 2.5.6 Electron Spectroscopic Methods: XPS/ESCA/AES
- 2.5.7 Microscopy and Microanalysis: SEM/TEM/EDX/WDX





Course Registration

Please register online at www.corrosionclinic.com
Or use the form below (photocopies of this form may be used for multiple bookings).

Dr/Mr/Ms _____

Organization _____

_____

Contact Person _____

Contact Dept _____

Telephone _____ Fax _____

Email _____

Payment should be made by TT or online banking. Currencies in Australian Dollar, Canadian Dollar, US Dollar, Euro and Sterling Pound can be transferred directly without conversion. Our bank details can be found at the link below:

https://www.corrosionclinic.com/payment.html

Course Fee and Discount

Standard: $4,950 **Discount**: $4,455

The fee includes a hardcopy of course note, certificate, light lunch, coffee breaks each day during the course.

Discount applies to a group of 3 or more persons from the same organization registering at the same time, or early-birds making payment at least 8 weeks before the course commencing date.

Cancellation and Refunds

Cancellation or replacement should be conveyed to WebCorr in writing (email or fax). An administration charge of 50% of the course fee will be levied if the cancellation notice is received from 14 to 7 days before the course commencing date. No refund will be made for cancellation notice received 6 days and less. No refunds will be given for no-shows. Should WebCorr find it necessary to cancel a course, paid registrants will receive full refund. Refund of fees is the full extent of WebCorr's liability in these circumstances.

WebCorr has NACE certified Corrosion Specialist (#5047) providing customized in-house training, online and distance learning corrosion courses, corrosion seminars and workshops on corrosion, materials, metallurgy, paints and metallic coatings. Our corrosion courses are developed and taught by NACE certified Corrosion Specialist with over 30 years of practical experience in the field. Our training success is measured by your learning outcome.