Lecture: Advanced Integrated Circuit Technology

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Seminar Topics/Questions

Seminar 1: 2021-07-04

Deposition Processes 1

Part 1 : Basics

- Basic steps/mechanism of CVD/Epitaxy
- Arrhenius plot, reaction and transport limited regime
- Definition of step coverage
- Approaches for metallization / interconnect systems:
    - architecture-wise
    - material-wise
    - process flow for the two different architectures
- Classification of CVD processes
- Which types of chemical reactions involved Chemical Vapor Deposition processes do you know?

Part 2: CVD of conductive diffusion barriers / epitaxy / low-k dielectrics

- What are requirements for diffusion barriers (against Cu diffusion)?
- Please name the two steps in an MOCVD TiN deposition process using TDMAT precursor!
- What is the purpose of plasma post-treatment of MOCVD deposited TiN diffusion barrier films?
- Please define the term “epitaxy” as a special type of CVD process!
- What is the difference between “homoepitaxy” and “heteroepitaxy”?
- What is the motivation to use low-k dielectrics instead of conventional silicon dioxide as insulator/dielectric in on-chip interconnect systems?
- How can a lower k-value be achieved compared to SiO2?
- Which types of processes can be used for low-k dielectric deposition? Which of those is most frequently used in IC production?
- Which type of post-deposition (curing) processes can be used to form porous low-k dielectrics? What is the purpose of those curing processes and which film properties are affected?