Chemical Engineering Principles of CVD Processes - Video course

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Chemical Engineering

COURSE OUTLINE

Chemical vapor deposition (CVD) is a process widely used in high-technology industries, as well as in more prosaic applications such as glazing of mirrors. The process involves many core chemical engineering disciplines, such as multi-component mass transfer, heat transfer, chemical reaction engineering and equilibrium thermodynamics. For students that have received basic as well as advanced training in these aspects, this course is intended to further their learning and to provide a practical framework to apply their learning.

COURSE DETAIL

S No	Topic
1	**Introduction**:Importance of CVD processes; historical perspective
2	**Basics of CVD**: multi-component mass transfer; heat transfer; chemical reactions; thermodynamics; phase equilibria; design and optimization of CVD reactors; effects of impurities in reacting gases and on target substrate; high-temperature CVD processes; effects of CVD deposits on the substrate; dynamics and control of CVD processes; low-pressure CVD (LPCVD) and plasma-enhanced CVD (PECVD**);** transport effects on apparent dew-points; physicochemical properties of deposits & their consequences; dynamics, control & optimization of CVD process
3	**Practical Applications of CVD**: semiconductors and related devices; microelectronic circuit manufacturing; metal oxide deposition for superconductor contacts; thin film deposition and nano-materials; coatings on glass; optical fibers; production of ceramic-matrix composites; vapor deposition processes in high-temperature chemically reacting environments (e.g., combustion turbines)

Pre-requisites:

Basic UG courses in Thermodynamics, Heat Transfer, Mass Transfer, Momentum Transfer, Chemical Reaction Engineering

Coordinators:

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References:

TEXT:

Rosner, D.E., “Transport Phenomena in Chemically Reacting Flow Systems”, Dover, 2000

REFERENCES:

1. P. O’Brien, A.C. Jones, “CVD of Semiconductors: Preparation and Uses”, Wiley, 1995
2. H.H. Lee, “Fundamentals of Microelectronics Processing”, McGraw-Hill, 1990
3. F.S. Galasso, “Chemical Vapor Deposited Materials”, CRC Press, 1991
4. D.M. Dobkin, M.K. Zuraw, “Principles of Chemical Vapor Deposition”, Springer, 2003
5. D.L. Smith, “Thin Film Deposition: Principles and Practice”, McGraw-Hill, 1995