

# Area Selective Thin Film Deposition

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## Webcast Version

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Host: American Vacuum Society – Webcast

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## Syllabus

### I. Introduction to Area Selective Deposition (ASD)

- A. *Opportunities and needs in thin film deposition*
- B. *Overview of Physical Vapor Deposition (PVD), Chemical Vapor Deposition (CVD), Atomic Layer Deposition (ALD) Conditions that influence deposition*
- C. *Types of selective deposition*

### II. Nucleation Mechanisms during CVD and ALD

- A. *Nucleation energetics and kinetics*
- B. *Nuclei evolution – sintering, Ostwald ripening,*
- C. *Nucleation at low temperature vs high temperature*

### III. Area Selective CVD

- A. *Applications for area selective CVD*
- B. *Substrate selective Si and GaAs epitaxy*
- C. *Area selective metal CVD*

### IV. Motivation and Approaches for ASD

- A. *ASD in microelectronics*
- B. *ASD in catalysis*
- C. *ASD in other applications*
- D. *Approaches to ASD*
- E. *Two-step and Three-step AS-ALD*
- F. *Mechanisms for selectivity loss in ASD*

**V. Models for Nucleation and ASD**

- A. *First-principles modeling*
- B. *Empirical models for nucleation and island growth*
- C. *Quantitative description of selectivity*
- D. *Analytical model for nucleation rate and selectivity evolution*

**VI. ASD Materials and Processes**

- A. *ASD of Metal on Metal*
- B. *ASD of Metal on Dielectric*
- C. *ASD of Dielectric on Metal*
- D. *ASD of Dielectric on Dielectric*
- E. *ASD of Organics, hybrid materials and metal-organic frameworks (MOFs)*

**VII. Summary and Future Challenges**