

**Southwest Center for Microsystems Education (SCME)  
University of New Mexico**

**MEMS Fabrication Topic**

**Deposition Overview for  
Microsystems Learning Module**

This booklet contains six (6) units  
Knowledge Probe (Pre-test)  
Primary Knowledge  
Terminology Activity  
Science of Thin Films Activity  
Deposition Research Activity  
Assessment

A Learning Module Map is provided for the instructor as a suggested outline on how to use this learning module.

*The purpose of this learning module is to introduce students to the common processes used to deposit thin films in the fabrication of micro-size devices. Activities provide further exploration into these processes as well as the properties of the thin films deposited.*

Target audiences: High School, Community College, University

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## Learning Module Map for Deposition Overview for Microsystems

*The purpose of this learning module is to introduce students to the common processes used to deposit thin films for the fabrication of micro-size devices. Activities provide further exploration into these processes as well as the properties of the thin films deposited.*

Learning Module units (6):

- Knowledge Probe (KP)
- Deposition Overview Primary Knowledge unit PK
- Deposition Terminology Activity
- Science of Thin Films Activity (SCME Kit available)
- What do you know about deposition? Activity
- Final Assessment

**Following is a suggested map on the implementation of this learning module.**

| <b>IMPORTANT STEPS</b>   | <b>KEY POINTS</b>   | <b>REASONS</b>   |
|--|---|--|
| Inquiry Activity –<br>Ask the participants the following questions:<br>“Why are layers needed to construct microdevices?”<br>“What type of layers are needed to construct microdevices?” | Give time for the participants to think about the different parts of a microdevices or component and determine “if” layers are needed and what type of layers (structural, sacrificial, insulating, conductive, etc.) | Before discussing the various types of deposition, students need to know the importance of deposition in building microdevices, and the fact that different types of layers require different types of deposition processes. |
| Deposition Knowledge Probe (KP)  | The KP determines the participants’ current understanding of MEMS deposition processes.   | Having the participants complete both the KP and the final assessment will help to determine the effectiveness of the learning module.   |

|   |  |   |
|---|--|---|
| <p>Present the <u>Deposition Overview</u> PK</p>                                      | <p>A PowerPoint presentation can be downloaded by the instructor from <a href="http://scme-nm.org">scme-nm.org</a> and presented to all participants OR a narrated presentation can be downloaded by the participants.</p> <p>After viewing the learning module summary presentation, participants should read the PK.</p> | <p>An introduction into deposition is needed to help participants better understand how microsystems are fabricated.</p> <p>This PK explains the various processes, the differences between the processes, and how each processes is used in the fabrication of MEMS.</p> |
| <p>Complete the activity “Deposition Terminology”</p>                                 | <p>The terminology and basic concepts of deposition are reinforced.</p>  | <p>Participants need a thorough understanding of deposition terminology to work in microtechnology arenas.</p>  |
| <p>Complete the activity “Science of Thin Films” (a supporting SCME is available)</p> | <p>(This activity and kit used to be called “Rainbow Wafer”)<br/>Participants explore the deposition of silicon dioxide on silicon, light interference with thin films, and etch rates vs. thin film thicknesses.</p>  | <p>Participants should have a basic understanding of etch and what it is, and an understanding of Angstroms.</p>  |
| <p>Complete the activity “What Do You Know About Deposition?”</p>                     | <p>Participants demonstrate their understanding of the various deposition processes and their applications in MEMS fabrication.</p>  | <p>Participants need a thorough understanding of deposition terminology and the basic concepts. They need to know the differences between the various types of deposition processes before moving on to other processes.</p>  |
| <p>Deposition Final Assessment (FA)</p>   | <p>Give the participants the <u>Deposition Overview</u> final assessment.</p>  | <p>Participants are evaluated on what they have learned about the different types of deposition and the differences between deposition processes.</p>   |

*Adapted from Graupp, P. & Wrona, R. (2006) The TWI Workbook: Essential Skills for Supervisors. New York, NY. Productivity Press.*

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