

543 M5850 微奈米機電系統 MEMS & Nanotechnology

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Office hour by appointment (ideally by email)

Outlines:

1. What is MEMS?
Introduction to Microscopic World
2. Review of Standard VLSI Microfabrication, Processes in CMOS
3. MEMS Fabrication Process I — Bulk Micromachining:
MEMS Fabrication Process II — Surface Micromachining:
4. Non IC-based micromachining
5. Integration of Microstructures and Electronics, MEMS plus CMOS
6. Micro sensors: Physical and Chemical
7. Nano Technology:
Atomic force Microscopy, Scanning Near-field Microscopy, Scanning Tunneling Microscopy
8. Intermolecular forces & Molecular interaction
9. Biosensors
10. Lab-on-chip

Recommended Textbooks:

1. M. Madou, Fundamentals of Microfabrication, 1997 (CRC Press).
2. G.T.A. Kovacs, Micromachined Transducer Sourcebook, 1998
3. S. D. Senturia, Microsystem Design, 2001 (Kluwer Academic publishers)
4. 莊達人, VLSI 製造技術, 1995 (高立圖書有限公司)
3. S.M. Sze, VLSI Technology, 2nd ed., 1988 (McGraw Hill).
4. 積體電路製程及設備技術手冊, 張俊彥主編, 1997.
5. R. Muller et. al., Microelectromechanical Systems: Advanced Materials & Fabrication Methods, 1997 (National Academy Press).
6. Williams S. Trimmer (ed), Micromechanics and MEMS: classic and seminal papers to 1990, 1996 (IEEE Press)
7. Charles P. Poole Jr., Frank J. Owens, Introduction to Nanotechnology, Wiley, 2003
8. T.-J. Chung, P.M. Anderson, M.-K. Wu, and S. Hsieh, Nanomechanics of Materials and Structure, Springer, 2006

MEMS Literature

Journals

1. J-MEMS: Journal of Microelectromechanical Systems, IEEE/ASME joint publication (ISSN 1057-7157) quarterly from March 1992.
2. JMM: Journal of Micromechanics and Microengineering, American Institute of Physics (ISSN 0960-1317) quarterly from march 1991.
3. S&A: Sensors and Actuators A, Elsevier Sequoia (ISSN 0924-4247) 5 vol. Per year, 3 issues per volume.
4. Lab-on-chip
5. Science and Nature

Conferences

1. MEMS: IEEE MEMS Workshop, since 1987.
2. Transducer: International Conference on Solid-State Sensors and Actuators, Biannual since 1981.

Grading

Homework, Presentation	60%
Final exam	40%