國立成功大學機械工程系 **Fall Term 2022**

半導體製程(Introduction to Microelectronic Fabrication Processes)

學分: 3 教室: 91303

時間: 週一 5, 6, 7

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課程說明: 介紹半導體各重要的單元製程原理、相關的製程設計分析、製程整合、以及一般積體電路元件設計製作之標準製程

Textbook:

Course Notes

課程網頁: http://klab.me.ncku.edu.tw/

課程進度:

週數	日期	內容	備註
1	9/05	課程介紹,相關規定, Historical review	
1	9/05	IC Fabrication overview, industries	
2	9/12	MEMS / Packaging overview	
2	9/12	Semiconductor Physics and Materials	
3	9/19	Semiconductor Physics and Materials	
3	9/19	Semiconductor Physics and Materials	
4	9/26	Wafer Manufacturing	
4	9/26	Wafer Manufacturing	
5	10/03	Diffusion and Oxidation	
5	10/03	Diffusion and Oxidation	
6	10/10	國慶日放假	
6	10/10	國慶日放假	
7	10/17	Diffusion and Oxidation	
7	10/17	Diffusion and Oxidation	
8	10/24	Lithography	
8	10/24	Lithography	
9	10/31	Ion Implantation	
9	10/31	Ion Implantation / Etching	
10	11/07	Etching	
10	11/07	Etching / Thin Film Process	
11	11/14	Thin Film Process	
11	11/14	Thin Film Process	
12	11/21	Thin Film Process	
12	11/21	Metallization & Interconnections	
13	11/28	Metallization & Interconnections	
13	11/28	CMP Process Overview	
14	12/05	MEMS design and Fabrication	

14	12/05	MEMS Integration Example	
15	12/12	Process Integration : Isolation	
15	12/12	Process Integration : MOS, BJT, CMOS	
16	12/19	Process Integration: CMOS A simple circuit case study	
16	12/19	Packaging	
17	12/26	Semiconductor Fabrication mechanics problems	
17	12/26	Semiconductor equipment design problems	
18	01/02	期末考（另擇時）	
18	01/02	期末考（另擇時）	

成績計算:

Homework 20%, Term paper 10 %, 4 Quizzes: total 70%

Q1: ~ 10 月中, cover to Semiconductor physics, process overview, wafer manufacturing

Q2: ~ 11 月中, cover diffusion/oxidation; lithography; ion implantation

Q3: ~ 12 月中, cover Thin film, Metallization, CMP

Q4: 期末時間, cover MEMS, packaging, process integration, mechanics

4 選三 (if Covid 19 still bothers us!)

Major reference:

1. (*, X) H. Xiao, *Introduction to Semiconductor Manufacturing Technology*, Prentice-Hall, 2001.
2. (*, C) S. A. Campbell, *The Science and Engineering of Microelectronic Fabrication,*"Oxford, 1996 (民全 or 台北)
3. P. Van Zant, *Microchip Fabrication,* 4rd edition, McGraw-Hill, 2000 (滄海)
4. (*, J) R. C. Jeager, *Introduction to Microelectronic Fabrication,* Addison-Wesley, 1988
4. (*, 莊) 莊達人 *VLSI 製造技術,* 2nd Ed., 2002 (高立)
5. S. Wolf and R. N. Tauber, *Silicon Processing for the VLSI Era, Vol. 1: Process Technology,* 1986
6. S. K. Ghandhi, *VLSI Fabrication Principle,2nd ed.* Wiley, 1994 (台北)
7. J. D. Plummer, M. D. Deal, and P. B. Griffin, *Silicon VLSI Technology, Fundamentals, Practice and Modeling,* Prentice Hall, 2000.(高立)

(*) 表示為主要之參考書.

Term Paper:

1. Select one historical paper, provide a 2-page summary, make presentation slide, record the presentation for 12 minutes.