

課程資訊 (Course Information)					
科號 Course Number	10720IPT 599600	學分 Credit	3	人數限制 Size of Limit	30
中文名稱 Course Title	有機光電特論：物理・材料和元件				
英文名稱 Course English Title	Selected topics in organic optoelectronics: physics, materials and devices				
任課教師 Instructor	大江昌人				
上課時間 Time	W3W4F3	上課教室 Room	台達 202		

課程大綱(Syllabus)
<p>課程內容請依下列項目輸入：</p> <p>1. Course Description(課程說明)</p> <p>This course is newly offered constructively for graduate and senior undergraduate students. Organic optoelectronic devices such as the liquid crystal display (LCD) and organic light-emitting diode (OLED) consist of interdisciplinary technologies. This new course offers physics, materials science and device applications about LCD and OLED including other optoelectronic devices such as quantum dot displays and μ-light emitting diode (μ-LED) displays. This course is oriented to material viewpoints, however, the course “有機光電材料科學” (in the Fall semester) is not necessarily prerequisite for this course.</p> <p>* The course is offered in English.</p> <p>** The first lecture will begin on Feb.22 (Fri), which means we will have no class on Feb.20 (Wed)</p> <p>2. Text Books(指定用書)</p> <p>No textbook.</p> <p>3. References(參考書籍)</p> <p>“Concepts of Modern Physics”, sixth edition, by Arthur Beiser (Mc Graw Hill);</p> <p>“Modern Quantum Mechanics”, by J.J. Sakurai (Addison-Wesley Publishing Company);</p> <p>“Organic Electro-Optics and Photonics: Molecules, Polymers and Crystals” by L. R. Dalton (Cambridge Univ. Press);</p> <p>“Optics and nonlinear optics of liquid crystals”, by Iam-Choon Khoo (World Scientific).</p> <p>“Introduction to liquid crystals –Chemistry and Physics–”, by Peter J. Collings and Michael Hird (Taylor&Francis)</p> <p>“Liquid crystal displays”, by Ernst Lueder (Wiley-SID series in display technologies)</p>

“OLED Displays and Lighting”, by Mitsuhiro Kodon (IEEE Press, John Wiley & Sons, 2017); …, etc.

4. Teaching Method(教學方式)

Combination of blackboard teaching with power point viewgraphs.

Report presentation by students.

5. Syllabus(教學進度)

Session 0: Introduction – Course guide –

Session 1~2: Overview of liquid crystal display (LCD)

- Various flat panel display (FPD), • Operating principles of LCD and driving schemes,
- Manufacturing process, • Peripheral technology supporting liquid crystal industry, … etc.

Session 2~5: Fundamentals of LC

- What is LC? • Classification of LC, • Discovery of LC and history, • Why LC molecules tend to align?
- Order parameter and director, • Phase transition, • Frank’s elastic free energy,
- Interaction with electric and magnetic field, • Frederik's transition,
- Optics of LC, • Topological defects of LC, • LC display modes, • In-plane switching LCD mode, …etc.

Session 6~8: Overview of organic light-emitting diode (OLED)

- History of OLEDs, • Operation principles of OLED, • OLED device structures, • Fabrication process,
- Driving technologies of OLED display, • OLED Lighting, • Flexible OLEDs, • Other technologies, …etc.

Session 8~10: Fundamentals of OLED

- Light emission mechanism, • Elementary processes, • Unit of light, • Efficiency, • Light extraction,
- OLED materials, • Energy transfer, • Marcus theory, …etc.

(Session 10: Midterm)

Session 11~12: Quantum dot display

Session 13~14: μ -light emitting diode (μ -LED) display

Session 15~16: TBA

Session 17: Final

** The contents and plans will be appropriately changed and adjusted during the course.

6. Evaluation(成績考核)

Homework and assignment (30%), Final exam including a report (40%), Class attendance and participation (30%)

7. Webpage(可連結之網頁位址)

No webpage available, but lecture notes and other supplemental materials are uploaded in iLMS.