

| | | | |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------|
| 科目名 | 特別講義 2010-2 – Introduction to Energy Conversion – | 開講学期 | 前期 |
| 英文科目名 | Special Lecture 2010-2 | 単位数 | 1 |
| 担当教員 | Prof. Itaru Kamiya, Prof. Minoru Sasaki (TTI) Prof. Zingway Pei, Prof. Yeu-Long Jiang, Prof. Han-Wen Liu, Prof. Shu-Tong Chang (NCHU) | メール | kamiya mnr-sasaki |

| |
|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 授業の目的・方針 |
| ① This course will introduce the basics of energy conversion in semiconductor structures and devices, solar cells, organic devices, and MEMS. |
| ② This course will expose students to the English vocabulary, pronunciation and communication. |

| |
|----------------------------------------------------------------------------------------------------------------------------------|
| 授業の達成目標（この授業科目終了時において達成すべき重要な目標） |
| ① To understand the basics of energy conversion in semiconductor structures and devices, solar cells, organic devices, and MEMS. |
| ② To improve vocabulary, pronunciation and communication skills. |

| |
|--------------------------------------------------------------------|
| 成績評価の方法〔評価対象となる授業の達成目標〕 |
| All students will be graded PASS / FAIL based on the reports. 〔①②〕 |

| |
|----------|
| 教科書 |
| Handouts |

| |
|--------------------------------------------------------------------------------------------------|
| 参考書 |
| (1) S. M. Sze: "Semiconductor Devices: Physics and Technology" (Wiley, 2001) ISBN978-0-471333722 |
| (2) H. Klauk: "Organic Electronics" (Wiley, 2006) ISBN978-3-527312641 |

| |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 学習上の注意事項 |
| Fundamental knowledge on semiconductors and quantum mechanics is necessary. This lecture is collaborated with 國立中興大學 (National Chung Hsing University) in English. |

| |
|------|
| 履修条件 |
| |

| 授業計画 | | | |
|------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| 回 | テーマ | 内容 | 担当 |
| 1 | Semiconductor Quantum Structures | Basic electronic properties Growth and synthesis | Prof. Itaru Kamiya |
| 2 | Energy Conversion using Quantum Structures | Photon absorption, Luminescence, Photovoltaics, Carrier generation | Prof. Itaru Kamiya |
| 3 | Electrostatic actuator for driving with low power consumption | Actuation methods for microactuators, Characteristics of electrostatic force, Technical challenges | Prof. Minoru Sasaki |
| 4 | MEMS for reducing in-process products, ~case study~ | Digital Micromirror Device: Filmless theater, Grating Light Valve: Film-less plate for offset printing, Spatial Light Modulator: Maskless lithography | Prof. Minoru Sasaki |
| 5 | Optoelectronic Device | Organic Thin Film Transistors, Organic Photovoltaic Devices | Prof. Zingway Pei |
| 6 | Solar energy conversion by thin-film silicon solar cells | Solar energy, solar cells fabrication, silicon thin-film materials, development of silicon thin-film solar cells | Prof. Yeu-Long Jiang |
| 7 | Reliability of thin-film transistors | 1. The instability mechanism of a-Si TFTs 2. The instability mechanism of LTPS TFTs | Prof. Han-Wen Liu |
| 8 | Strain Effect in SiGe Materials and Devices | 1. Basic Strain Properties of Semiconductor 2. Band Structures of Strained SiGe 3. Transport Theory of Strained SiGe 4. Strain Engineering in SiGe Devices | Prof. Shu-Tong Chang |