Advanced Theory of Semiconductors

2 units (selection)

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Target〉 To understand semiconductor physics and fundamental device operations for various semiconductor devices

Outline〉 Semiconductor physics, especially behavior of carriers in semiconductor, is described. Properties of pn junction and Schottky barrier, including non-ideal case, are also lectured.

Style〉 Lecture

Keyword〉 ***semiconductor, metal-semiconductor contact, pn junction diode***

Relational Lecture〉 "**Advanced Device Processing**"(0.5), "**Advanced Theory of Electron Devices**"(0.5), "**Advanced Optoelectronic Devices**"(0.5)

Goal〉

1. To understand behavior of carries (such as scattering mechanisms) in semiconductor
2. To solve diffusion equations in simple conditions
3. To understand properties of pn junction and Schottky barrier

Schedule〉

1. Crystal Structure
2. Energy Bands
3. Carrier Concentration at Thermal Equilibrium
4. Carrier Transport
5. Phonon
6. High-Field Effect
7. Continuity Equations and Diffusion Equations of Carriers
8. Band Structure of Metal-Semiconductor Contact
9. Current Transport Processes of Schottky Barrier
10. Charcterization of Schottky Barrier Height
11. Ohmic Contact
12. Band Structure of pn Junction Diode
13. Capacitance-Voltage Characteristics of pn Junction Diode
14. Current-Voltage Characteristics of pn Junction Diode
15. Heterojunction
16. Examination

Evaluation Criteria〉 Report 50%, Examination 50%. More than 60% is required to pass this class.

Textbook〉 Physics of Semiconductor Devices, by S.M.Sze

Contents〉 http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216816

Contact〉

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