Nonlinear Optical Devices

2 units (selection)

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Target〉 To understand the principle, tipical structure, advantages and disadvantages of current nonlinear optical devices. To develop ability to design new devices and solve verious problems for applications.

Outline〉 Physics of second-order and third-order nonlinear optical phenomena. Principles of electro-optics. Optical nonlinearities in fibers. Photorefractive materials. Nonlinear optical media. Anisotropic nonlinear optical media. Dispersive nonlinear optic media. Coupled-wave theory. Electro-optic and acousto-optic devices. Second-order and third-order nonlinear optic devices. Photonic switches. All-optical switches. Bistable optical devices. Optical connections.

Style〉 Portfolio

Keyword〉 ***nonlinear optics, harmonic generation, nonlinear optical device, optical switch***

Relational Lecture〉 "**Optical and Functional Inorganic Materials**"(0.5)

Requirement〉 Student should have fundamental knowledge of electromagnetic theory, waveoptics, optical properties of materials and lasers.

Notice〉 授業を受ける際には，2 時間の授業時間毎に 2 時間の予習と 2 時間の復習をしたうえで授業を受けることが，授業の理解と単位取得のために必要である.

Goal〉

1. Possible to explain princiles, structure and characteristics of optoelectric devices.
2. Possible to explain princiles, structure and characteristics of the second-order nonlinear optical devices.
3. Possible to explain princiles, structure and characteristics of the third-order nonlinear optical devices.

Schedule〉

1. Introduction & interview
2. nonlinear optical phenomena
3. Electrooptic effect and its applications
4. Magnetooptic effect and its applications
5. Acoustoptic effect and its applications
6. principle of second-order nonlinear effects
7. Second-order nonlinear optical materials
8. Second-order nonlinear optical devices
9. principle of third-order nonlinear effects
10. third-order nonlinear optical materials
11. Third-order nonlinear devices
12. Experiment for nonlienar optical phenomena
13. Current application of nonlinear devices
14. Photonic crystal
15. Integrated optical devices

Evaluation Criteria〉 Activity:20%, reports:40% and oral examinations:40%

Textbook〉 After interview, we will decide suitable text books.

Contents〉 http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216850

Contact〉

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