

Advanced Materials Science

2 units (selection)

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Target The purpose of this class is to understand the basic concepts of functional materials and the most up-to-date analytical procedures, which are necessary in developing new material science.

Outline Recent development in the preparation, crystal structure, luminescence and applications of silicon-based oxynitride and nitride phosphors for white light-emitting diodes (LEDs) will be explained.

Style Lecture

Keyword *oxynitride, white LED, powder X-ray diffraction, XAFS*

Fundamental Lecture “Physical Properties of Materials”(1.0), “Material Science”(1.0)

Relational Lecture “Solid State Ionics”(0.5), “Advanced Environmental Technology on Chemistry”(0.5)

Requirement Requires undergraduate level knowledge of materials chemistry.

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. To understand the basic concepts of oxynitride phosphors for white LEDs in the lectures from 1st to 8th.
2. To understand the advanced analytical procedure such as XRD and XAFS in the lectures from 9th to 15th.

Schedule

1. Introduction
2. Roles of phosphors in white LED
3. Classification and crystal chemistry of (oxy)nitride compounds
4. Green emitting phosphors
5. Yellow emitting phosphors
6. Red emitting phosphors
7. Synthesis of silicon-based (oxy)nitride phosphors
8. Epilogue
9. Principle of X-ray diffraction
10. Measurement and analysis of powder X-ray diffraction data

11. Crystallography for X-ray diffraction

12. Introduction to Reitveld analysis

13. Introduction to XAFS

14. Measurement of XAFS - transmission and fluorescence method -

15. Analysis of XAFS data

Evaluation Criteria Assignment counts 100% mainly based on the reports submitted.

Textbook To be announced in the class.

Reference To be announced in the class.

Contents <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216665>

Student Able to be taken by only specified class(es)

Contact

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