

北海道大学シラバス					
<div>科目名</div>					
応用物質化学（機能固体材料化学）					
<div>講義題目</div>					
<div>責任教員（所属）</div>					
島田 敏宏（大学院工学研究院）					
<div>担当教員（所属）</div>					
島田 敏宏（大学院工学研究院）					
<div>科目種別</div>				<div>他学部履修等の可否</div>	可
<div>開講年度</div>	2022	<div>期間</div>	通年不定期	<div>時間割番号</div>	094210
<div>授業形態</div>	講義	<div>単位数</div>	1	<div>対象年次</div>	～
<div>対象学科・クラス</div>				<div>補足事項</div>	
<div>ナンバリングコード</div>	CHEM_ELMAT 6101				
<div>大分類コード</div>	<div>大分類名称</div>				
CHEM_ELMAT	総合化学院(物質化学コース科目)				
<div>レベルコード</div>	<div>レベル</div>				
6	大学院（修士・専門職）専門科目（発展的な内容の科目、研究指導科目）				
<div>中分類コード</div>	<div>中分類名称</div>				
1	工学				
<div>小分類コード</div>	<div>小分類名称</div>				
0	応用物質化学				
<div>言語</div>					
英語で行う授業					
<div>実務経験のある教員等による授業科目</div>					

キーワード

electronic materials and devices, thermoelectrics, solar cells, hard materials, solid state physics

## ■ ■ 授業の目標

The first goal is to understand the "heart" of chemistry and physics of solid state functional materials and obtain the ability to design and create new materials. The second goal is to understand what is written in literature with theoretical description. The lecture and the homeworks will be organized to achieve this goal.

## ■ ■ 到達目標

By the end of this course you will be able to

1. Explain how the devices explained in the lecture works.
2. Obtain basic knowledge of solid state materials.
3. Read advanced literature about the related topics.

## ■ ■ 授業計画

Topics other than the following list can also be lectured according to request.

1. Introduction to solid state chemistry / physics and thermoelectricity
2. Semiconductors focused on solar cells
3. Transparent conductors (oxides, nanowires, graphene)
4. Advanced ligand field theory and basics of photophysics - lasers, nonlinear optics, optical fibers
5. Interfaces: work function and chemistry of semiconductor junction devices
6. Phase memory materials (DVD-R/W, shape memory alloys)
7. Ferroelectrics and shape memory alloy
8. Thermography and strongly correlated electron systems

Related theoretical concepts will be introduced every time.

## ■ ■ 準備学習(予習・復習)等の内容と分量

Preparation: read the handout posted on the website (URL will be given at the first lecture).

Homework: solve the problem given in the lecture and write a brief final report.

## ■ ■ 成績評価の基準と方法

Grading is based on the quiz given at each lecture and the final report.

## ■ ■ 有する実務経験と授業への活用

## ■ ■ 他学部履修の条件

## ■ ■ テキスト・教科書

Handout will be given prior to the lecture via website

## ■ ■ 講義指定図書

## ■ ■ 参照ホームページ

[This course will be provided as part of the Hokkaido Summer Institute.](https://hokkaidosummerinstitute.oia.hokudai.ac.jp/en/courses/CourseDetail=G067)

[For more information \(invited lecturers, course details, etc.\), please visit the website below:](https://hokkaidosummerinstitute.oia.hokudai.ac.jp/en/courses/CourseDetail=G067)

<https://hokkaidosummerinstitute.oia.hokudai.ac.jp/en/courses/CourseDetail=G067>

■ ■ 研究室のホームページ

<https://www.eng.hokudai.ac.jp/labo/kotai/en/index.html>

■ ■ 備考

■ ■ 更新日時

2022/03/01 13:58:23



Hokkaido University Syllabus					
<div> <div></div> <div>Course Title</div> </div>					
Applied Materials Chemistry (Functional Solid State Materials Chemistry)					
<div> <div></div> <div>Subtitle</div> </div>					
<div> <div></div> <div>Instructor (Institution)</div> </div>					
SHIMADA Toshihiro ( Faculty of Engineering )					
<div> <div></div> <div>Other Instructors (Institution)</div> </div>					
SHIMADA Toshihiro ( Faculty of Engineering )					
<div> <div></div> <div>Course Type</div> </div>				<div> <div></div> <div>Open To Other Faculties / Schools</div> </div>	OK
<div> <div></div> <div>Year</div> </div>	2022	<div> <div></div> <div>Semester</div> </div>	Full Year (Irregular)	<div> <div></div> <div>Course Number</div> </div>	094210
<div> <div></div> <div>Type of Class</div> </div>	Lecture	<div> <div></div> <div>Number of Credits</div> </div>	1	<div> <div></div> <div>Year of Eligible Students</div> </div>	～
<div> <div></div> <div>Eligible Department / Class</div> </div>				<div> <div></div> <div>Other Information</div> </div>	
<div> <div></div> <div>Numbering Code</div> </div>	CHEM_ELMAT 6101				
<div> <div></div> <div>Major Category Code</div> </div>	<div> <div></div> <div>Major Category Title</div> </div>				
CHEM_ELMAT	Chemical Sciences and Engineering_Elective Course for Materials Chemistry				
<div> <div></div> <div>Level Code</div> </div>	<div> <div></div> <div>Level</div> </div>				
6	Specialized Subjects (advanced) in graduate level (Master's Course and Professional Course)				
<div> <div></div> <div>Middle Category Code</div> </div>	<div> <div></div> <div>Middle Category Title</div> </div>				
1					
<div> <div></div> <div>Small Category Code</div> </div>	<div> <div></div> <div>Small Category Title</div> </div>				
0					
<div> <div></div> <div>Language Type</div> </div>					
Classes are in English.					
<div> <div></div> <div>Course list by the instructor with practical experiences</div> </div>					

Key Words

electronic materials and devices, thermoelectrics, solar cells, hard materials, solid state physics

## ■ ■ Course Objectives

The first goal is to understand the "heart" of chemistry and physics of solid state functional materials and obtain the ability to design and create new materials. The second goal is to understand what is written in literature with theoretical description. The lecture and the homeworks will be organized to achieve this goal.

## ■ ■ Course Goals

By the end of this course you will be able to

1. Explain how the devices explained in the lecture works.
2. Obtain basic knowledge of solid state materials.
3. Read advanced literature about the related topics.

## ■ ■ Course Schedule

Topics other than the following list can also be lectured according to request.

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2. Semiconductors focused on solar cells
3. Transparent conductors (oxides, nanowires, graphene)
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6. Phase memory materials (DVD-R/W, shape memory alloys)
7. Ferroelectrics and shape memory alloy
8. Thermography and strongly correlated electron systems

Related theoretical concepts will be introduced every time.

## ■ ■ Homework

Preparation: read the handout posted on the website (URL will be given at the first lecture).

Homework: solve the problem given in the lecture and write a brief final report.

## ■ ■ Grading System

Grading is based on the quiz given at each lecture and the final report.

## ■ ■ Practical experience and utilization for classes

## ■ ■ Condition of tasking the subject

## ■ ■ Textbooks

Handout will be given prior to the lecture via website

## ■ ■ Reading List

## ■ ■ Websites

[This course will be provided as part of the Hokkaido Summer Institute.](https://hokkaidosummerinstitute.oia.hokudai.ac.jp/en/courses/CourseDetail=G067)  
[For more information \(invited lecturers, course details, etc.\), please visit the website below:](https://hokkaidosummerinstitute.oia.hokudai.ac.jp/en/courses/CourseDetail=G067)  
<https://hokkaidosummerinstitute.oia.hokudai.ac.jp/en/courses/CourseDetail=G067>

## ■ ■ Website of Laboratory

<https://www.eng.hokudai.ac.jp/labo/kotai/en/index.html>

■ ■ Additional Information

■ ■ Update

2022/03/01 13:58:24

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