科目ナンバリング												
授業科目 <英訳>			Conversion-E2 Conversion-E2			担当者所属 職名・氏名 工学研		研究科	抖 講師 PARK , Jaehong		, Jaehong	
群	自然科学科目群 分野(分類) 化学(発展)							使用言語 英語				
旧群	B群	単位数	2単位	週コマ数	1=	コマ 摂		業形	態 講	義 (対面授	(対面授業科目)	
開講年度・ 開講期	2024・前期 曜時限			 火4			当学	1学年 主として1回		性 対象学	:生 3	理系向
[授業の概要・目的]												

Course overview: We will discuss basic chemical and physical principles as well as various approaches of solar energy conversion

[到達目標]

1. Course overview

global energy problem and overview of photo-energy conversion

2. Semiconductors

electrons and holes in semiconductors, Fermi energy, electrochemical potential, work function, charge generation and recombination, radiative and nonradiative recombination

3. Basic structure of solar cells

basic mechanisms, pn-junction, heterojunction, Dye solar cell, organic solar cell

4. Alternative Solar Energy Conversion

Conversion of thermal radiation into chemical energy, Conversion of chemical energy into electrical energy

[授業計画と内容]

Topics week Notes

Course overview, Background & Basics 1,2 global energy problem and overview of photo-energy conversion, black-body radiation, photon density, solar spectrum, absorption, solar radiation

Semiconductors 3-7

electrons and holes in semiconductors, Fermi energy, electrochemical potential, work function, charge generation and recombination, radiative and nonradiative recombination, electron/hole transport and diffusion

Basic structure of solar cells 8-12

basic mechanisms, pn-junction, heterojunction, maximum efficiency of solar cells, organic solar cells, inorganic solar cells

Alternative Solar Energy Conversion 13-14

solar fuels, tandem cells, concentrator cells, thermophotovoltaics, up- and down-conversion of photons

Final Exam week 15

Photo-Energy Conversion-E2(2)

[履修要件]

特になし

[成績評価の方法・観点]

Quizzes: There will be three quizzes. The sum of 3-quiz grade will count 30% towards the final grade.

Grades: One final presentation (40%), 3 quizzes (30% = $3 \times 10\%$), 2 homeworks (20% = $2 \times 10\%$), attendance and class participation (10%)

[教科書]

使用しない

[参考書等]

(参考書)

Arno H. M. Smets, Klaus Jager, Olindo Isabella, Rene Van Swaaij, Miro Zeman, [©] Solar Energy: The Physics and Engineering of Photovoltaic Conversion, Technologies and Systems ^a (Uit Cambridge Ltd.) ISBN:9781906860325

Peter Wurfel, Physics of Solar Cells, 2nd ed. 2009 (Wiley-VCH publisher)
Jenny Nelson, Physics of Solar Cells, 2nd ed. 2003 (Imperial College Press)

[授業外学修(予習・復習)等]

Homework: During the semester, you will have two homework assignments and the sum of 2 grades, will count 10% towards the final grade. Only legible and intelligible answers will be considered, and otherwise, you will lose some or all credits for the problem. No late homework turn-in will be accepted, unless the late return is excused.

[その他(オフィスアワー等)]

Instructor: Jaehong Park (email: j.park@moleng.kyoto-u.ac.jp)

Course meeting: (Yoshida South campus, XXX, XXX), 1 session/week, 90 mins/session

Office hour: (Location and Time: Katsura campus, A4-205, appointment by email).