Course number	U-LAS13 20017 LE60				
Course title (and course title in English)	Chemistry in Solar Energy Conversion-E2 Chemistry in Solar Energy Conversion-E2	Instructor's name, job title, and department of affiliation	Graduate School of Engineering Senior Lecturer,PARK, Jaehong		
Group	Natural Sciences	Field(Classification)	Chemistry(Development)		
Language of instruction	English	Old group	Group B	Number of credits	2
Number of weekly time blocks	1	Class style	Lecture (Face-to-face course)	Year/semesters	2025・First semester
Days and periods	Tue.4	Target year	Mainly 1st & 2nd year students	Eligible students	For science students

[Overview and purpose of the course]

With the industrial and technological development, the demand of human beings for more energy rising quickly. People have begun to search next generation energy-sources to preserve the nature and to cope with the fossil-fuel depletion.
Solar energy is one of important alternative energy source, and solar energy conversion became a big topic of people's interest.
As an elementary level, we will learn the current knowledge of solar energy conversion process, current available techniques, and future possibilities in terms of science, technology, and industry.

[Course objectives]

In this course, we aim to learn basic chemical and physical principles, terminology, issues relevant to solar energy conversion. In addition, we expect to understand the current problems and research opportunities in this topic.

[Course schedule and contents)]

Contents will be discussed in the class. (The number does not mean the number of classes) The course schedule is subject to change, depending on the student's understanding.

1. Global energy problem and overview of solar energy conversion
2. Light, black-body radiation, photon, Solar spectrum
3. Light absorption
4. Electrons and holes in semiconductors
5. Fermi energy, electrochemical potential, work function
6. Charge generation and recombination
7. Radiative and nonradiative electron/hole recombination
8. Electron/hole transport, diffusion and drift
9. Basic solar cell operation mechanisms
10. PN-junction, heterojunction, maximum efficiency of solar cells
11. Organic/inorganic solar cells
12. Solar fuels, tandem cells
13. Thermophotovoltaics
14. Up/down conversion of photons
15. Spectroscopic approach on solar energy conversion

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Chemistry in Solar Energy Conversion-E2(2)

[Course requirements]

None

[Evaluation methods and policy]

Final term project (50%), 4 small tasks (40%; quiz, report, homework), attendance and class participation (10%)

[Textbooks]

Not used

[References, etc.]

（References, etc.）

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』 （Uit Cambridge Ltd）
ISBN:9781906860325

[Study outside of class (preparation and review)]

Students are responsible for reviewing each class and preview.

[Other information (office hours, etc.)]

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

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

Office hour:
Option 1- At Katsura campus(A4-205), any date could be possible, but appointment by email.
Option 2- At Yoshida campus, on Tuesday appointment by email.

[Essential courses]