

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]							
<p>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.</p> <p>Solar energy is one of important alternative energy source, and solar energy conversion became a big topic of people's interest.</p> <p>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.</p>							
[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)]							
<p>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.</p> <ol style="list-style-type: none"> 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 							
<div>-----</div> <div>Continue to Chemistry in Solar Energy Conversion-E2(2)</div>							

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 Swaij, 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]