

PHYS-609

**Modern photovoltaic technologies**

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Cursus	Sem.	Type
Advanced Manufacturing		Opt.
Photonics		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Oral presentation
Workload	60h
<b>Hours</b>	<b>27</b>
Lecture	18
Exercises	9
<b>Number of positions</b>	

**Frequency**

Every year

**Remark**

Next time: Spring 2023

**Summary**

A link between the fundamental physics, device operation and technological development of various solar cell technologies. Learning about all modern photovoltaic technologies incl. industrially relevant wafer based silicon, thin film chalcogenide, III-V, multijunction, organic and hybrid solar cells.

**Content**

Day 1

- 1.1 Introduction, solar cell basics and operation, current of solar cell technologies
- 1.2 CIGS & CdTe solar cells
- 1.3 III-V solar cells

Day 2

- 2.1 Organic semiconductors - molecular orbitals and photoinduced processes
- 2.2. Organic and Dye-sensitized solar cells
- 2.3. Perovskite and Hybrid solar cells

Day 3

- 3.1. Crystalline Si: wafer-based solar cells
- 3.2. Junction formation and processing
- 3.3. Advanced silicon solar cell designs

**Keywords**

photovoltaics, inorganic semiconductors, organic semiconductors, optics, light management

**Learning Prerequisites****Recommended courses**

Basic physics, basic chemistry, introduction to quantum mechanics

**Teaching methods**

Three days teaching (ex-cathedra with short questions)

**Expected student activities**

One day to work on individual exercises and to prepare a 10 min presentation

### **Assessment methods**

Presentaion of the assignment on the last day

### **Resources**

#### **Moodle Link**

- <https://go.epfl.ch/PHYS-609>