

Module Advanced Semiconductors

W. Heiss, P. Wellmann, C. J. Brabec

M1 Modul: Semiconductor: Fundamentals, Characterization, Materials & Processing (W. Heiss)

- Advanced Semiconductors Introduction: Fundamentals (Lecture) (WS 2023/2024)
(Lecture, 2 SWS, [Wolfgang Heiß](#), Zeit: Tuesday 16:15 – 17:45, Lecture room:SRTL (307) Seminarraum Tandemlabor (307)) (Physikalisches Institut)
- Crystal Growth 1 - Fundamentals of Crystal Growth and Semiconductor Technology (Lecture) (WS 2023/2024)
(Lecture, 2 SWS, [Peter Wellmann](#) Monday 10:15-11:45 Lecture Room: 3.71)
- Wide Bandgap Semiconductors & SiC Semiconductor Wafer Characterization (Lecture) (WS 2023/2024)
(Lecture, 1 SWS, [Peter Wellmann](#) starts on November 21st, 2023, 16:15-17:45 Lecture Room 3.71)
- Advanced Semiconductors Introduction: Characterization (Lecture) SS 2024)
(Lecture, 2 SWS, [Wolfgang Heiß](#))

M2 Modul: Semiconductor: Devices and Applications (C. J. Brabec / A. Osvet)

- Advanced Semiconductors Introduction: Devices & Applications (Lecture) (WS 2023/2024)
(Lecture, 2 SWS, Andres Osvet, Christoph Brabec) Tuesday 14:15-15:45 Lecture Room 3.71
- Lab Work Thin Film Semiconductors (Labwork) (SS 2024)
(Labwork, 2 SWS, presence required, [Andres Osvet](#), time and location will be announced in StudOn)

Module Adv. Semicond. Tech. I: **Solution processed semiconductors**

C. J. Brabec, M. Halik, H.-J. Egelhaaf, W. Heiss

M3/M4/M5/M10/M11 Modul: AST: Solution Processed Semiconductors I – Materials & Nanocrystals (W. Heiss)

- Advanced Semiconductor Technologies - Materials for Organic Electronics (Lecture)

(Lecture, 2 SWS, [Marcus Halik](#)) Friday 14:15 – 15:45 Lecture Room 3.71

- Kolloidale Nanokristalle (Vorlesung) (SS 2024 - optional)

(Lecture, 2 SWS, [Wolfgang Heiß](#))

- Seminar on "Solution Processed Semiconductors" (Seminar) (WS 2023/2024)

(Seminar, 2 SWS, [Wolfgang Heiß](#),) Do 10:15 – 11:45, Lecture Room is not assigned

M3/M4/M5/M10/M11 Modul: AST: Solution Processed Semiconductors II – Processing (H.-J. Egelhaaf)

- Advanced Semiconductor Materials - Excited States and Charge Transport in Organic Semiconductors (Lecture)

(Lecture, 2 SWS, [Hans-Joachim Egelhaaf](#) et al.) Di 10:15-11:45 Lecture Room 3.71

- [Advanced Semiconductor Technologies - Processing \(including Lab Work Organic Electronics Processing\)](#) (Lecture with Exercises) (SS 2024)

(Lecture with Exercises, 2 SWS, [Hans-Joachim Egelhaaf](#))

M3/M4/M5/M10/M11 Modul: AST: Solution Processed Semiconductors III – Devices (C. J. Brabec /Th. Heumüller)

- Lab Work Solution Processed Electronics (Lab works), will be shifted to SoSe 24, the Lab. Work is optimal after the lecture

(Lab Works, 2 SWS, Thomas Heumüller, [Andres Osvet](#))

- Advanced Semiconductor Technologies - Solution Processed Devices / Applications (SS 2024)

(Lecture, 2 SWS, [Christoph J. Brabec](#))

Module Adv. Semicond. Tech. II: **Photovoltaic Systems**

C. J. Brabec, J. Hauch, M. Peters, A. Osvet, F. Baumgartner

M3/M4/M5/M10/M11 Modul: AST: Photovoltaic Systems I – PV Fundamentals & Materials (C. J. Brabec)

- Advanced Semiconductor Technologies - Photovoltaic Systems for Power Generation - Design Implementation and Characterization (Lecture WS 2022/23)
(Lecture with Exercises, 2 SWS, [Christoph J. Brabec](#)) Do 8:15-9:45 Lecture Room H14
- [Lab Work Characterization and Advanced Defect Imaging of PV Modules and Systems \(Lab works\)](#)
(Lab Works, 2 SWS, 2 ECTS Jens Hauch et al.) Mo 10:00 – 18:00, start on 4.12.23. details will be discussed during the lecture,
- Seminar and Conference Participation on Solar Energy – optional, will be replaced by a seminar from the MAP-course Electronic Materials
(Seminar, 2 SWS, 2 ECTS, Christoph Brabec et al.)

M3/M4/M5/M10/M11 Modul: AST: Photovoltaic Systems II – Light Conversion & Management (M. Batentschuk)

- [Phosphors for Light Conversion in Photovoltaic Devices and LEDs \(Lecture\)](#)
(Lecture, 2 SWS, [Mirosław Batentschuk](#)) Fr 12:15-13:45 in H14
- [Lab Work Manufacturing and Characterization of Phosphors and Storage Phosphors \(Lab Works\)](#) (SS 2024)
(Lab work, 2 SWS, [Andres Osvet](#))

M3/M4/M5/M10/M11 Modul: AST: Photovoltaic Systems III – PV Technology, in SoSe 2024 (Christoph Brabec/ Marius Peters/Franz Baumgartner)

Modules of CEP: Photovoltaic systems - Fundamentals (5 ECTS), with Lab Course (7.5 ECTS)
Phosphors for light conversion in photovoltaic devices and LEDs (5 ECTS), with lab course
(7.5 ECTS)



Photovoltaic Systems – PV Fundamentals (C. J. Brabec)

- Advanced Semiconductor Technologies - Photovoltaic Systems for Power Generation - Design Implementation and Characterization (Lecture WS 2023/24)
(Lecture with Exercises, 2 SWS, [Christoph J. Brabec](#)) Do 8:15-9:45 Lecture Room H14
- [Lab Work Characterization and Advanced Defect Imaging of PV Modules and Systems \(Lab works\)](#)
(Lab Works, 2 SWS, 2.5 ECTS Thomas Heumüller et al, block course, February 2024, **details will be discussed during lectures**)
- Exercises Photovoltaic systems - Fundamentals (CEP) (Ex-PVS-F), 2 SWS 2 ECTS – start and details will be discussed at the lecture.

Phosphors for light conversion in photovoltaic devices and LEDs (M. Batentschuk)

- [Phosphors for Light Conversion in Photovoltaic Devices and LEDs \(Lecture\)](#)
(Lecture, 2 SWS, [Mirosław Batentschuk](#)) Fr 12:15-13:45 in H14
 - [Lab Work Manufacturing and Characterization of Phosphors and Storage Phosphors \(Lab Works\) \(SS 2024\)](#)
(Lab work, 2 SWS, 2,5 ECTS, [Andres Osvet](#))
- Exercises Phosphors for Light Conversion in Photovoltaic Devices and LEDs (CEP) (Ex-PVS-LC), Donnerstag 8.15 – 10.30, No exercise on 19.10.2023.
The first exercise will take place on 26.10.2023.
Room of the first exercise: [13003.U1.850 \(SR Biologie Seminarraum Biologie Nr. U1.850 \(Vorbelegungsrechte des Dept. Biologie im SoSe bis 31.01., im WiSe bis 15.07.\)\)](#)
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Excercises Photovoltaic systems – Fundamentals (CEP- Module)

(Dr Karen Forberich)

- Exercises will start on **November 30th**, 10.15 am – 11.45 am, room to be announced
- In December, simulation methods for solar cells will be introduced in the class. The students should bring their own laptop.
- In January, the students will have to hand in four sets of homework that are obligatory to pass. The homework will be explained (before) and discussed (afterwards) during the class.

Master Courses in “Crystal Growth & Technology” (Prof. Dr. Peter Wellmann)

Module Crystal Growth 1 (part of M1 module @ WW6(i-meet) → WINTER TERM)

Fundamentals of Crystal Growth & Semiconductor Technology

Fundamentals of crystal growth with focus on melt growth, introduction to the processing of Si-based semiconductor devices using planar technology
P. Wellmann, 2 SWS / 3 ECTS

→ starts on Monday, October 23rd, 2023 (10:15-11:45), **Flipped classroom concept** (live discussion in room 3.71 every 2nd week, → Studon)

Wide Bandgap Semiconductors & SiC Semiconductor Wafer Characterization

Overview on Wide Bandgap Semiconductors Diamond, SiC, GaN, AlN, ZnSe, ZnO and Ga₂O₃, special emphasis on properties, applications, growth methods P. Wellmann, 1 SWS / 2 ECTS

→ starts on November 21st, 2023 (16:15-17:45), **Flipped classroom concept** (live discussion in room 3.71, 3 appointments → Studon)

→ electronic EXAM (eKlausur)

Module Crystal Growth 2 → SUMMER TERM

Electronic Devices & Materials Properties / Processing, Epitaxial Growth → summer term 2024

(pn-diode, bipolar transistor, Schottky diode, MESFET + MOSFET, interfaces, epitaxial growth, optoelectronic devices based on hetero- and quantum-structures, overview on solar cells)

P. Wellmann, 2 SWS / 3 ECTS

Practical Lab Training - Semiconductor Wafer Characterization OR Crystal Growth InSb boule by Czochralski

P. Wellmann + Tutors, 1 experiment (= 2 days in the lab) / 2 ECTS, written report → summer term 2024

→ electronic EXAM (eKlausur)

Module Crystal Growth 3 → SUMMER TERM

Numerical Simulation of the Crystal Growth Process using COMSOL Multi-Physics

P. Wellmann + Tutors, 2 SWS training + mini-project (with grading) / 5 ECTS → summer term 2024 (WW zip pool)