Module label: Advanced Photovoltaic Cell Design

Module code: pre352

Credit points: 5.0 KP

Workload: 150 h

Used in course of study: Master's Programme European Master in Renewable Energy (EUREC) > Mastermodule

Contact person: 

Entry requirements: 

Skills to be acquired in this module:
- Critically appraise the choice of semiconductors used and the design and fabrication methods used to produce an advanced PV device.
- Critically appraise the characterisation methods used with semiconductor materials and with PV devices.
- Perform a literature review on advanced PV devices to a professional standard.
- Present data and information both verbally and in the written form to a professional standard.

Module contents:
1. Introduction
   - Flat plate modules, Concentrator solar cells. Multijunction concepts.
   - Overview of types of solar cell developed - status of the technologies.
2. Advanced Devices
   - Polycrystalline silicon.
   - Space applications. Physics of multijunction cells. Quantum well devices.
   - Thermophotovoltaic devices.
3. Advanced Characterisation Methods
   - Material characterisation: X-ray diffraction, electron and ion beam characterisation methods, optical characterisation, Van der Pauw length.
   - Device Characterisation: DLTS, photoluminescence and PAS.
   - Solar simulators.
   - Measurement of fill-factor, solar conversion efficiency and spectral response.
   - I-V-T and C-V-f measurements. Radiation damage
4. Literature Review
   This will be undertaken for one of the following topics: crystalline silicon devices, III-V devices or thin film devices.

Reader’s advisory:
Journals of “Solar Energy Materials and Solar Cells” and “Progress in Photovoltaics”.
Proceedings of IEEE Photovoltaic Specialist Conferences.

Links:

Language of instruction: English

Duration (semesters): 1 Semester

Module frequency: jährlich

Module capacity: unlimited

Modulelevel: MM (Mastermodul)

Modulart: Pflicht

Lern-/Lehrform / Type of program: Lectures, seminars

Vorkenntnisse / Previous knowledge: 

Examination: 
Time of examination: At the end of the semester
Type of examination: Written report (literature review): The module assessment is in the form of a review of approximately 3,000 words, chosen by the student from a list of PV device categories.

Course type: Seminar

SWS: 
Frequency: 
Workload attendance: 0 h