Organic Electronics 1, 6.0 credits

Organisk elektronik 1, 6.0 hp

Third-cycle education course

6FITN02

Department of Science and Technology

Valid from: First half-year 2024

Approved by
The Board of PhD Studies

Approved
2024-02-28

Registration number

Entry requirements

Basic skills in modern physics (primarily solid state physics), mathematics and electronics. Basic chemistry is useful but not a formal requirement. TNE024 Molecular Physics is recommended, especially for students who also intend to follow Organic Electronics 2.

Admitted to studies at postgraduate level.

Learning outcomes

After finishing the course, the students should be able to:

- explain charge transport, energy levels, and doping in organic electronic materials, and how they compare to metals and inorganic semiconductors
- exemplify specific organic electronics materials, their properties, and applications
- summarize the optical properties and applications of organic electronic materials, such as in displays and photovoltaic systems
- exemplify the architecture, characterization, and utilization of electronic components based on organic electronic materials (such as conductors, resistors, capacitors, diodes, transistors)
- determine fundamental parameters for the above mentioned components, and explain how these parameters influence the performance of the components
- summarize the electrochemical properties of organic electronic materials, and their applications in devices and systems
- explain and motivate the use of organic electronic materials in biological applications
- summarize device fabrication techniques, especially related to “printed electronics”
- compare commercial applications for organic electronics, and summarize the current market.

Contents

Course lectures will cover topics such as: introduction to organic electronic materials and their basic properties; charge transport and energy structure of organic electronics; case-studies on specific materials used in current research; optical properties (energy levels, color changes, light emission and absorption); organic electronic circuit components (conductors, resistors, capacitors, diodes, transistors); electrochemistry of organic electronic materials, and applications of redox properties; organic bioelectronics (motivation, applications in neuroscience and plant biology); printed electronics (methods, inks, applications); organic electronics photovoltaics (measurement techniques, solar cells); an overview of current applications and commercialization (cost, implementation, environmental consideration).
The discussion sessions (lektioner) will cover the topics above, in a more open discussion format.

Educational methods

Lectures and discussion sessions.

Examination

Written examination

Grading

Two grade scale, older version

Course literature

Articles

General information

Education components

Preliminary scheduled hours: 36 h

Recommended self-study hours: 124 h