PHYSICAL AND TECHNO-LOGICAL SCIENCES

Charge Carriers Transport in Disordered Materials

Keywords: *charge carriers transport, recombination, disordered materials, organic materials, organic electronics, OPV, OFET, formation of the organic layers, TOF, CELIV.*

Vilnius University

Research group activities

The main goal of the laboratory is to expand usage of disordered organic and inorganic materials in electronics, for example increasing stability and efficiency of organic solar cells or sensors for radiology. This could be achieved by analysing charge carriers transport in new materials for possible applications (organic field effect transistors, organic solar cells), establishing link between material structure, layer composition, morphology and transport properties.

Therefore, we focus on finding correlation between material structure and properties of charge carriers transport. This knowledge could help to synthesize new materials. Moreover, our group is working on development of new electrical or photo-electrical characterization techniques for estimation of the main transport parameters from a real device structures.

Proposal

- Formation of the organic layers and devices from solution.
- Estimation of drift mobility, recombination mechanism and lifetime of charge carriers.
- Characterisation of organic solar cells and field effect transistors.
- Modelling of charge carriers transport.
- Development of the new electrical and photo-electrical characterisation techniques for charge carriers transport.

Collaboration: We also seek R&D groups working in the field of organic electronic, which are synthetizing new n and p type polymers or small molecules for charge carriers transport and also groups working on real device fabrication and characterization.

Meet our team

Group leader

Dr. **Kristijonas Genevičius**

Team members

Prof. **Gytis Juška**
analytical calculations, experiment

Dr. **Nerijus Nekrašas**
numerical modelling, experiment

Doc. **Mindaugas Viliūnas**
numerical modelling, electronics

PhD student

Andrius Aukštuolis
technology, experiment

Research outcomes

Our group is well known for the introduction and development of charge carrier's extraction by linearly increasing voltage (CELIV) technique. This technique allows evaluation of charge carriers mobility, recombination mechanism and lifetimes in the systems where conventional techniques (for example time of flight) are not applicable. CELIV became one of the major investigation techniques in the field of organic semiconductors and particularly for the investigation of organic solar cells.

Resources

Fume hoods and all basic equipment for cleaning procedures, glovebox for sample preparation from solution under inert atmosphere, equipment for evaporation of the metal electrodes.

Complete setups for time of flight, double injection, space charge limited current and charge carriers extraction by linearly increasing voltages techniques (Nd:YAG laser, tuneable wavelength laser, cryostats, memory oscilloscopes and etc.).

Solar simulator with two channels voltage-current source meter for solar cells and field effect characterization.

Contacts

Dr. Kristijonas Genevičius
Institute of Chemical physics, Faculty of Physics

Phone: +370 5 2234553
E-mail: kristijonas.genevicius@ff.vu.lt

More about the faculty: http://ff.vu.lt/en

Department for Research and Innovation

Phone: +370 5 268 7006
E-mail: innovations@mid.vu.lt

More information: http://www.innovations.vu.lt