

# Photophysical Properties of Organic Materials

*Keywords: spraying, electrospraying, mobility, time of flight, ionization potential, electron counter, spectral distribution of photogeneration and absorption, spectral photoconductivity.*



## Research group activities

Due to the acceleration of the global warming, the development of renewable energy sources is now relevant more than ever. Therefore, our research group seeks to improve the sensitivity of the detection of electrons emitted by ultraviolet radiation, by utilising a slow photoelectron-counting cell and expanding the spectral range of measurements to 180 nm. This will make the research of new organic semiconductors more successful, while assessing their suitability for use in renewable energy sources.

The research group explores new organic materials for the production of solar cells and other organic electronic devices: detects charge carrier mobility of these materials, ionization potential, HOMO, LUMO levels. The group can produce and investigate organic electrophotographic receptors, organic solar cells and organic light emitting diodes.



## Proposal

- To form layers of large area (up to 200 mm x 200 mm) TiO<sub>2</sub> by spraying;
- To form film-layers of organic and inorganic materials from solutions by spraying and casting;
- To investigate the spectral distribution of photogeneration, optical absorption and photosensitivity of charge carriers;
- To investigate the characteristics of mobility or capture of charge carriers in semiconductors;
- To measure the spectrum of emitted photoelectrons and determine the ionization potential of the material;
- To measure very low currents;
- To measure the surface potential and its distribution over the area of a few decimetres.



## Meet our team

Assoc. Prof. Dr. **Vygintas Jankauskas**, Group leader. Physicist, over 170 publications, 28 patents, monograph, an expert in charge transfer and charge carrier mobility measurements.

Habil. Dr. **Valentas Gaidelis**, Chief researcher. Physicist, over 51 publications, 40 patents, an expert in electron counter development, sample preparation and organic electronics.

Assoc. Prof. Dr. **Robertas Maldžius**, Chief researcher. Physicist, over 30 publications, 3 patents, monograph, an expert in photoreceptors and data analysis, using theoretical models or numerical simulation methods.

Dr. **Egidijus Kamarauskas**, Junior researcher. Physicist, over 8 publications, an expert in ionization potential measurements and solar cell preparation.

**Jonas Nekrasovas**, Junior researcher. Physicist, PhD student, an expert in spray technologies, sample preparation and mobility measurements.



## Research outcomes

Researchers of the group carry out various joint projects together with scientists of the Organic Chemistry Department at Kaunas University of Technology. The researchers of the group have participated in projects financed by the EU Structural Funds.

Currently, the group carries out a project "Investigation of Energy Levels and Charge Transfer Parameters in New Bipolar Organic Materials", financed by the Research Council of Lithuania.

The results are published in publications in prestigious scientific journals.

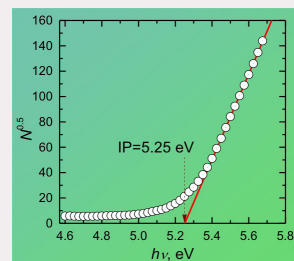
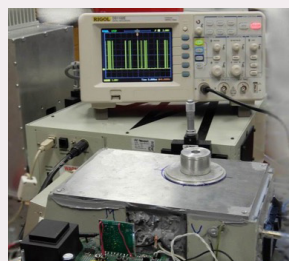
The group stands out with over 40 US (together with the European Union and other countries) patents, created in cooperation with Imation and Samsung.



## Resources

The group has equipment for preparation of the semiconductor samples in an inert gas chamber, experimental devices for measurement of charge carrier mobility, ionization potential, conductivity, light absorption, spectral distribution of electrophotographic sensitivity. The group has created a prototype of photoelectron-counting yield spectroscopy and will improve it further.

The group maintains strong relations with chemists, who synthesise new organic materials for electronic devices.



## Contacts

**Assoc. Prof. Dr. Vygintas Jankauskas**  
**Faculty of Physics,**  
**Department of Solid State Electronics**

Phone: +370 5 223 4557, +370 5 223 4548  
E-mail: [vygintas.jankauskas@ff.vu.lt](mailto:vygintas.jankauskas@ff.vu.lt)

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

**Department for Research  
and Innovation**

Phone: +370 5 268 7006  
E-mail: [innovations@mid.vu.lt](mailto:innovations@mid.vu.lt)

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