

Online scientific training program

Lazarenko Maksym, Doctor of Physical and Mathematical Sciences, Associate Professor at the Department of Molecular Physics, Faculty of Physics of Taras Shevchenko National University of Kyiv

Laboratory of Conjugated Polymers, at the Department of Polymers for Alternative Energy and Environmental Protection, Institute of Polymers of the Bulgarian Academy of Sciences

Project title: "Phase transitions in crystals formed by aliphatic chains with conjugated bonds under conditions of limited space"

Duration of the online scientific training: 180 hours (6 ECTS credits)

Dates of the online scientific training: September 6, 2021 to November 5, 2021

The objectives of the online scientific training: mastering thermophysical research methods and applying them to the study of phase transitions in limited systems

Detailed plan of the program and its completion status

No	Activity	Dates, Duration, (credits)	Execution status
1.	Preliminary research of the publications on phase transitions of crystals in confined space conditions, focusing on the impact of pore size and chemical structure of the surface on the phase transitions in aliphatic crystals.	6.09-10.09 20 hours (0.6 ECTS credits)	Completed
2.	Introduction to Perkin Elmer TGA 4000 instruments. Mastering the methods of processing the thermogravimetric experimental data.	13.09-17.09 20 hours (0.6 ECTS credits)	Completed
3	Processing thermogravimetric experimental data for the 1-octadecene and undecylenic acid in silica gel pores. Processing the temperature dependences of mass loss of the 1-octadecene and undecylenic acid in porous silica gel. Determining the content of the 1-octadecene and undecylenic acid in porous matrices.	20.09-24.09, 27.09-01.10 40 hours (1.4 ECTS credits)	Completed
4	Introduction to DSC Q2000 TA Instruments setup. Mastering the methods of processing the experimental DSC data for the 1-octadecene and undecylenic acid in silica gel pores.	4.09-8.09 20 hours (0.6 ECTS credits)	Completed

5	<p>Processing DSC experimental data for the 1-octadecene and undecylenic acid in silica gel pores. Processing the data relating the temperature and the latent heat of the phase transitions for the solid 1-octadecene to the size of the pores with various surface modifications.</p> <p>Processing the data relating the melting temperature for the 1-octadecene and undecylenic acid to the size of the pores with various surface modifications.</p> <p>Fitting of the experimental dependencies for the melting temperature and the latent heat of phase transitions using theoretical models that describe the changes of these parameters for various pore sizes.</p> <p>Obtaining energy and structural characteristics of the 1-octadecene and undecylenic acid nanocrystals.</p>	11.10-15.10 18.10-22.10 40 hours (1.4 ECTS credits)	Completed
6	<p>Conducting the analysis relating the pores' sized and the chemical composition of the silica gel pore surface to the peculiarities of the phase transitions in the nanocrystals of the 1-octadecene and undecylenic acid in porous silica gel.</p> <p>Preparation of the project report titled "Phase transitions in crystals formed by aliphatic chains with conjugated bonds under conditions of limited space"; preliminary manuscript preparations.</p>	25.10-29.10 1.11-5.11 40 hours (1.4 ECTS credits)	Completed
Total:		180 hours (6 ECTS credits)	

The detailed program of the online scientific training course was reviewed at the meeting of the Department of Molecular Physics on September 2nd, 2021, minutes of the meeting № 2.

M.M. Lazarenko has completed the program of the online scientific training plan.

*Head of Department Polymers
for alternative energy and
environmental protection*



Prof. Neli Koseva