Profesor wizytujący - Nickolay Alexandrovich Charykov – specjalista w dziedzinie inżynierii materiałowej, nanotechnologii oraz nanotermodynamiki z Wydziału Chemii Fizycznej Instytutu Technologicznego w Petersburgu i Państwowego Uniwersytetu Elektrotechnicznego w Petersburgu kolejnym gościem Wydziału Fizyki Technicznej i Matematyki Stosowanej PG.

W dniach 22.03-03.04 br. nasz wydział będzie gościł profesora wizytującego - Nickolaya Alexandrovicha Charykowa - specjalistę w dziedzinie inżynierii materiałowej, nanotechnologii i nanotermodynamiki z Wydziału Chemii Fizycznej Instytutu Technologicznego w Petersburgu oraz Państwowego Uniwersytetu Elektrotechnicznego w Petersburgu. Nasz gość poprowadzi cykl wykładów, seminariów i konsultacji z zakresu fizykochemii powierzchni i nanomateriałów dla studentów studiów magisterskich z nanotechnologii. Szczegółowy opis kursu znajduje się poniżej biogramu naszego gościa, a szczegółowy harmonogram zajęć można znaleźć tutaj.

Studenci i doktoranci zainteresowani dodaniem przedmiotu prowadzonego przez Profesora Charykova do swojego programu studiów (Fizykochemia powierzchni i nanomateriałów, wymiar 30 godzin, rodzaj zajęć wykłady, 2 punkty ECTS, język prowadzenia zajęć – j.angielski) proszeni są o kontakt z kierownikiem dziekanatu WFTiMS Panią Ireną Dattą (irena.datta@pg.edu.pl).

Short BIO (facts & figures)

Charykov Nickolay Alexandrovich is currently a professor at the Department of Physical Chemistry of St. Petersburg State Technological Institute (Technical University) - SPbGTI(TU) and a professor at the Department of Physical Chemistry of St. Petersburg State Electrotechnical University (LETI). In the past, among others, he was the Head of the Physical Chemistry Department of SPbGTI(TU), a chief researcher in the Innovations of Leningrad Institutes and Enterprises CJSC (ILIP), a senior researcher in A. F. Loffe Physical-Technical Institute Rus. Ac. of Sciences in 1995- 1998, and a professor of Soros Foundation.

Professor Charykov is a very experienced researcher - head of 3 grants of the Russian Foundation for Basic Research - RFBR 2005-2007, 2015-2017, 2018-2020, contractor in 9 grants of RFBR, head of 2 grants of program Start (support of small entrepreneurship of Russia in the high-tech sector), the winner of the Grant of President of Russia for young doctors of Sciences (1998-2001), current expert of RFBR and a former expert of VAK Rus.Fed for the

inorganic chemistry. He is the author of 230 articles, with more than 1050 citations and the h-index of 14.

Most relevant publications:

1. Thermodynamic and quantum chemical investigation of the monocarboxylated fullerene Ci60CHCOOH. Charykov N.O., et al. Journal of Chemical Thermodynamics, v.140, 2020, n.105 898.

2. MWCNT in PEG-400 nanofluids for thermal applications: A chemical, physical and thermal approach. Charykov N.O., et al. Journal of Molecular Liquids, v.294, 2019 , n.111616

3. Thermodynamic and thermal properties of the C60-L-Arg derivative. Charykov N.O. et al. Journal of Chemical Thermodynamics, v.127, 2018, p.39-44.

4. Carboxylated fullerenes: Physico-chemical properties and potential applications (Hevievi). Charykov N.O. et al. Proqress in Solid State Chemistry, v.47-4B , 2017, p.19-3 6.

5. lmpact resistance of cement and gypsum plaster nanomodified by water- soluble fullerenols. Charykov N.O. et al. Industrial and lngin. Chemistry Research, v.52, 2013, p.14583-14591

https://www.scopus.com/authid/detail.uri?authorld=7005476609

Physical Chemistry of Surface and Nanomaterials

No.	Course contents
1.	Concept of nanomaterials. Classification of nanomaterials according to its: composition, nano-dimension, fractal dimension, type of consolidation of nano-elements. Specific physical and chemical properties of nano-systems. Dependence of pressure, melting temperature, chemical potential, heat capacity, lattice parameters etc on linear dimension of nano-particles. Historical and modem concept of nano-technology.
2.	Surface tension and specific surface area. Surface tension existence proof. Adhesion and cohesion. Concept of adsorption and absorption, chemical and physical adsorption, dependens on the parameters of state.
3.	Extensive and intensive conjugate state parameters. Phase and components number concepts. Fundamental differential and integral equations, taking into account surface forces, and extemal force fields. Gibbs principle of equilibrium, expressed through entropy and thermodynamic potentials .
4.	Stability criteria regarding to continuous and incontinuous small state changes. Binodal and spinodal differential equations. Critical phase concept. Main properties and differential equations of critical phases.

5.	Conditions of equilibrium of heterogeneous systems and Gibbs phase rule, taking into account surface forces, nano-phases presence and extemal force fields.
6.	Van-der-Waals differential equations of phase equilibrium shift in vector- matrix form and its sequences for single-component, binary and multicomponent system.
7.	Fundamental Gibbs equation of adsorption. Principle of Gibbs-Curie and principle Curie-Wolfe. Adsorption isotherm of Henry, Langmuir, Freundlich. BET adsorption isotherm.
8.	Same physical-chemical method of the investigation of nano-systems: - Classical spectral methods and methods, based of light scattering, - Microscopic methods: optical, polarization, X-ray, scanning tunnel, atomic force, etc., - Thermal methods: complex thermal analysis (TA, DTA, TG, DTG), calorimetry, methods, conjugated with structural methods, - Mass-spectrometry, chromatography and chromato-mass-spectrometry, - Methods determination of surface tension and specific surface area: static, semi-static and dynamie. Pore-metry and sorption-metry.