	SMIRNOV, Evgeny A. PhD
Research interests	✓ Nanotechnology, material science, nanoparticles: synthesis and properties of colloidal particles, preparation of novel materials ✓ Physical chemistry, surface chemistry: self-assembly at soft interfaces (liquid-liquid, liquid-air, etc.) ✓ Electrochemistry: investigation of properties of nanoparticles and their assemblies, in particular, for photocatalytic and electrocatalytic applications ✓ Analytical chemistry: application of nanoparticles and their assemblies for surface enhanced methods, for example, SERS, as well as in ELISA-based methods
Features of the PhD program	A unique opportunity to work with a wide variety of equipment, both self-made and within the CCU. In addition to the capabilities of the Infochemistry Research Center, the leader has a wide network of foreign scientific contacts - the University of Limerick, Ireland (self-assembly and electrochemistry), the University of Turku, Finland (electrochemistry), the University of Oldenburg, Germany (electrochemistry and nanotechnology), Fudan University, China (analytical chemistry). As a part of the grant work, postgraduate students will be provided with financial support.
List of the supervisor's research projects (participation/supervision)	✓ RSCF № 22-73-00206 Self-assembly of gold and silver nanoparticles at liquid-liquid interfaces as a platform for Surface Enhanced Raman Spectroscopy (supervision) ✓ TSITIS №AAAA-A20-120121790037-7 Development of technology for obtaining sunflower protein isolate (researcher) ✓ RSCF № 20-13-00330 Development of fluorescent sensor platforms based on composite materials for the determination of biologically active compounds in complex matrices (researcher)
List of potential thesis topics	✓ Self-assembly of (non)metallic nanoparticles at soft interfaces and their implementation for optics, catalytic and electrocatalytic applications ✓ Self-assembly of 2D materials (graphene, graphene oxide, MXene) at soft interfaces and investigation of their properties (optical, catalytic and electrocatalytic) ✓ Sensing elements based on in-situ generation of reagents (in particular, ELISA sensors with H2O2 in-situ generation)
Publications in the last five years	13 (Scopus / Web of Science / RSCI)

Key publications	1. Aglikov A., Volkova O., Bondar A., Moskalenko I., Novikov A., Skorb E.V., Smirnov E. Memristive Effect in Ti3C2Tx (MXene) Polyelectrolyte Multilayers//ChemPhysChem, 2023, Vol. 24, No. 17, pp. e202300187 2. Rukhlyada K.A., Matytcina V.V., Baldina A., Volkova O., Kozodaev D.A., Barakova N.V., Orlova O.Y., Smirnov E., Skorb E.V. Universal Method Based on Layer-by-Layer Assembly for Aptamer-Based Sensors for Small-Molecule Detection//Langmuir, 2023, Vol. 39, No. 31, pp. 10820-10827 3. Qi Z., Akhmetzhanov T., Pavlova A., Smirnov E. Reusable SERS Substrates Based on Gold Nanoparticles for Peptide Detection//Sensors, 2023, Vol. 23, No. 14, pp. 6352 4. Eremina O., Yarenkov N., Kapitanova O., Zelenetskaya A., Smirnov E.A., Shekhovtsova T., Goodilin E., Veselova I. Molecular Immobilization and Resonant Raman Amplification by Complex-Loaded Enhancers (MIRRACLE) on copper (II)–chitosan–modified SERS-active metallic nanostructured substrates for multiplex determination of dopamine, norepinephrine, and epinephrine//Microchimica Acta, 2022, Vol. 189, No. 5, pp. 211 5. Deng H., Peljo P., Huang X., Smirnov E., Sarkar S., Maye S., Girault H., Mandler D. Ionosomes: observation of ionic bilayer water clusters//Journal of the American Chemical Society, 2021, Vol. 143, No. 20, pp. 7671-7680
Key IPs	Patent application. A.E. Kuropteva, E.A. Smirnov, I.A. Vweselova, Patent application № 2022118324, Hydrogene Peroxide Generation Method for Application in Spectrophotometric, Colorimetric and Luminescent Analysis with Peroxidase, 2022
Supervisor's specific requirements	✓ Background in inorganic chemistry, physical chemistry, or biochemistry ✓ Hands-on-experience in laboratory and with basic laboratory equipment: mixers, heaters, glassware, pH-meters, conductometers etc. ✓ Analytical methods: SEM/TEM, DLS, spectroscopy (UV-Vis-IR), Raman ✓ Software: Office, OriginLab, ImageJ, script-writing Python or Wolfram Mathematica is welcomed
Code of the subject area of the PhD program	1.4.4 Physical Chemistry