



NARODOWE CENTRUM NAUKI



HR EXCELLENCE IN RESEARCH

Post-doc position

Computational and experimental studies of diffusion in crowded environments inside living cells

Background. Biochemistry of life, on the cellular level, is driven by two elementary physical processes: Diffusion of macromolecules and metabolites, and enzyme-catalyzed conversion of metabolites (the latter will not be considered in this project). The cytoplasm, the cellular interior where diffusion and reactions take place, is overcrowded with molecules, hence physicochemical conditions inside the cells differ significantly from what is used in a typical laboratory system. In particular, self diffusion coefficients of proteins and metabolites decrease significantly, and the diffusion process can anomalously slow-down under certain conditions. Since diffusion determines essentially the kinetics of many cellular processes, its study is of vital importance for life sciences and biotechnological applications.

Project description. The successful candidate will conduct simulation (and possibly experimental) studies of diffusion in crowded environments akin of the inside of living cells. Particular focus will be on the metabolism-dependent diffusion of macromolecules and intracellular metabolic transport. Computer simulations will be used to understand recent experiments showing a tremendous effect of the cell metabolism on the diffusion of large macromolecules, which slow down dramatically when the cell metabolism is suppressed. In the second part the focus will be on transport properties of metabolites, with the aim to develop a consistent method for determining the transport diffusion coefficients for future spatially-resolved whole-cell simulations. We also plan intensive interactions with experimentalists to carry out microfluidic experiments in order to validate the simulation results.

What we offer. We offer a NCN-funded 2 year post-doc position with a competitive salary of more than 1000 Euro (depending on the performance). The project will be carried out in the Institute of Physical Chemistry (ICP) located in a vibrant and fast developing city of Warsaw. The ICP is one of the leading research institutes in Poland and among the best in Central and East Europe. The project will be conducted in collaboration with RWTH (Aachen University, Germany) and Forschungszentrum Juelich (the largest research center in Europe), and/or microfluidics group of ICP.

Requirements. We are looking for an enthusiastic and motivated scientist with a background in physics, chemistry, biology or related fields of study. Experience in molecular simulations and/or microfluidic measurements is desirable, as well as good communication skills and strong interest in multidisciplinary research.

Required documents and deadline. CV, copy of PhD diploma, list of publications and research projects, cover letter and a recommendation letter. You will have to sign the consent to process your data (<http://ichf.edu.pl/Oswiadczenie-declaration.doc>). Deadline for applications: 15th May. Decision: 31st May.

How to apply. Send the required documents to S. Kondrat (skondrat@ichf.edu.pl and svyatoslav.kondrat@gmail.com). Informal inquiries are welcome.