FORM FOR EMPLOYERS

INSTITUTION - Department of Molecular Physics, Faculty of Chemistry, Lodz University of Technology

CITY – Lodz, Poland

POSITION – Post doctoral

DISCIPLINE – Bioengineering, Bioelectronics, Chemistry, Physics, and Medicine

POSTED – 05.03.2021

EXPIRES – 03.04.2021

WEBSITE – www.kfm.p.lodz.pl

KEY WORDS – peptides, cell grown, neuronal network, nanostructure, solution deposition

DESCRIPTION (field, expectations, comments): Today, organic semiconductors show by far higher charge carrier mobilities than inorganic amorphous silicon. This rapid progress is the outcome of research focused on design and synthesis of new conjugated organic compounds (both small molecules and polymers), as well as optimization of thin film processing and device architecture. Understanding on the role of molecular self-assembly and its relation to charge transport has led to superior devices performance of organic semiconducting films with highly ordered molecular structures.[1] An novel approach to control the self-assembly of conjugated molecules is the combination with biological units. A recent example is the connection of an oligoproline segment with perylene-monoimide chromophores. Depending on the substitution of the oligoproline by the perylene units, well defined triaxial topology was obtained which may find applications beyond electronics asfor example in catalysis or gas separation and storage.[2] Additionally, it has been proven that by comprising perylene chromophores, oligothiophenes, and the oligoproline scaffold a combination of electron-donor and electron-acceptor components

can be obtained and could be applicable in new type of organic electronics.[3] The interaction of biological and semiconductor molecular units is particularly essential in organic electrochemical transistors (OECTs). OECTs have been widely considered as promising devices for biological interfacing electronics or "bioelectronics" with applications in flexible biosensors, cell monitoring, electrophysiological recording electrodes, and neuromorphic computing. These devices bridge the gap between electronics and aqueous solutions (required for biological systems), using organic, flexible materials which have similar mechanical properties to human tissue with exceptional biocompatibility. We have already proven that for OECTs the deposition parameters and post processing of the conductive polymer have a tremendous impact on the conductivity, reducing the initial value of determined current by one order of magnitude by incorporation of an electrolyte due to swelling effects.[4] In the current project (www.sfa.p.lodz.pl) we gained comprehensive understanding on the control over the molecular self-assembly by the processing and post-processing parameters and on the correlation between the resulting molecular organization and electrical properties in devices. This fundamental knowledge on self-assembly of organic semiconductors can be now transferred to biological systems for their implementation in electronics.

Postdoc - PhD in Biology, Chemistry, Physics, Material Science or similar field. Due to the high interdisciplinary and advanced character of the planned research, an experienced Postdoc is required. The researcher will focus on deposition of the various peptides compatible with neuronal cell (supported by Master Student). Additionally, the Post doc will be involved in task (close cooperation with Max Planck Institute for Polymer Research) when the electrical response of the neuronal cell will be investigated.

1. J. J. Michels, K. Zhang, P. Wucher,P. M. Beaujuge, W. Pisula and T. Marszalek "Predictive modelling of structure formation in semiconductor films produced by meniscus-guided coating", Nature Materials, https://doi.org/10.1038/s41563-020-0760-2, 2020.
2. U. Lewandowska, W. Zajaczkowski, S. Corra, J. Tanabe, R. Borrmann , E. M. Benetti, S. Stappert, K. Watanabe, N. A. K. Ochs , R. Schaeublin, C. Li, E. Yashima , W. Pisula, K. Müllen and H. Wennemers NATURE CHEMISTRY, 2017, 9,
3. N. A. K. Ochs, U. Lewandowska, W. Zajaczkowski, S. Corra, S. Reger, A. Herdlitschka, S. Schmid, W. Pisula, K. Mullen, P. Bauerle and H. Wennemers, Chem. Sci., 2019, 10, 5391

4. L. V. Lingstedt, M. Ghittorelli, H. Lu, D. A. Koutsouras, T. Marszalek, F. Torricelli, N. Irina Craciun, P. Gkoupidenis, and P. W. M. Blom*, Adv. Electron. Mater. 2019, 5, 180080

Employment period: The researcher will be employed for a 12 months
Start date: 01/07/2021
Salary: ca. 7500 PLN gross (including taxes, seniority and other benefits)
Required documents: cover letter, personal questionnaire for a person applying for employment taking into account scientific achievements, opinion from the last place of employment (or from the supervisor, if he was not employed after doctorate), at least 2 recommendation letters and any additional relevant documents should be submitted by 03/04/2021 to the address: tomasz.marszalek@p.lodz.pl with the annotation

An agreement for the processing of personal data according to the following formula:
"I hereby give consent for my personal data included in my application to be processed for the purposes of the recruitment process under the Personal Data Protection Act as of 29 August 1997, consolidated text: Journal of Laws 2016, item 922 as amended."