Annotations of Doctoral Thesis Topics for Degree Course in

''Nanotechnology and Advanced Materials''

for the Academic Years since 2022/2023

Topic: Synthesis of polymeric memristors based on carbazole groups

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Annotation:

The dissertation will deal with the synthesis of hybrid conjugated polymers based on methacrylate or bithiophene main chain with carbazole functional groups, which will be chemically and electrochemically doped. Such conjugated polymers exhibit the ability to change conformation due to an external electric field, thereby changing their conductivity and exhibiting memristive behaviour. The prepared polymers will be characterized by electrochemical, spectroscopic and thermal methods such as cyclic voltammetry, nuclear magnetic resonance, dielectric spectroscopy, differential scanning calorimetry

Requirements:

Knowledge of general, macromolecular chemistry and physics at university level. Good knowledge of English, or potential for improvement. Basic manual and laboratory skills. Ability to work independently.

Literature:

1. Grant Benjamin; Bandera Yuriy; Foulger, Stephen H.; Vilčáková, Jarmila; Sáha, Petr; Pfleger Jiří: Boolean and elementary algebra with a roll-to-roll printed electrochemical memristor, *Advanced Materials Technologies*, 2022, Article Number2101108, DOI 10.1002/admt.202101108

2. Foulger, Stephen H.*; Bandera, Yuriy; Benjamin Grant; Vilčáková, Jarmila; Sáha, Petr: Exploiting multiple percolation in two-terminal memristor to achieve a multitude of resistive. *Journal of Materials Chemistry C*, 2021, vol. 9, pp.8975-8986, DOI: 10.1039/d1tc00987g

3. McFarlane, Tucker M.; Bandera, Yuriy; Grant Benjamin; Zdyrko, Bogdan; Foulger, Stephen H.; Vilčáková, Jarmila; Sáha, Petr; Pfleger, Jiří. Carbazole Derivatized n-Alkyl Methacrylate Polymeric Memristors as Flexible Synaptic Substitutes. *Advanced Electronic Materials*, 2020, 2020, 6(2), article number 2000042, DOI: 10.1002/aelm.202000042

 4. Memristors for Neuromorphic Circuits and Artificial Intelligence Applications, ISBN 978-3-03928-577-8, 2022, Publisher: Springer, https://www.mdpi.com/journal/materials