Prof. Dr. Jairo Sinova
Institut für Physik, SPICE
sinova@uni-mainz.de

JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Theory of Condensed Matter: Hard Condensed Matter

June 5, 2018 at 2 p.m.
Galileo room, 01-128 (Staudinger Weg 9)

Paschalis Gkoupidenis
Max Planck Institute for Polymer Research, Mainz, Germany

Neuromorphic devices using organic materials

Hardware-based implementation of neuromorphic architectures offers efficient ways of data manipulation and processing, especially in data intensive applications such as big data analysis and real time processing. In contrast to traditional von Neumann architectures, neuro-inspired devices may offer promising solutions in interacting with human sensory data and process information in real time.
Therefore such kind of devices may offer in the future novel ways of data manipulation in bioelectronics.
Over the past years, organic materials and devices have attracted lots of attention in bioelectronics due to their attractive characteristics for bioelectronics applications such as biocompatibility, the ability to operate in liquid electrolytes, tunability via chemical synthesis and low cost fabrication processes.

Here, various concepts of organic neuromorphic devices will be presented based on organic electrochemical transistors (OECTs), devices that are traditionally used in bioelectronics. Regarding the implementation of neuromorphic devices, the key properties of the OECT that resemble the neural environment will be presented here. These include the operation in liquid electrolyte environment, low power consumption and the ability of formation of massive interconnections through the electrolyte continuum. Showcase examples of neuromorphic functions with OECTs will also be presented, including short-, long-term plasticity and spatiotemporal or distributed information processing.

Contact:
Hjördis Pusch
hjopusch@uni-mainz.de