ORGANIC NANOSTRUCTURE DEVICES BASED ON ROLLED-UP NANOMEMBRANES

F. Zhu[a,b] P. F. Siles[a,b], V. K. Bandari[a,b], and O. G. Schmidt[a,b]

[a] Faculty of Electrical Engineering and Information Technology, Technische Universität Chemnitz, Reichenhainer Straße 70, 09126 Chemnitz, Germany
[b] Institute for Integrative Nanosciences, IFW Dresden, Helmholtz Straße 20, 01069 Dresden, Germany

Over the past decades organic nanostructures have attracted huge interest due to their importance in understanding fundamental properties and creating molecular electronic/spintronic nanodevices [1, 2]. Normally, molecular nanodevices rely on electronically connecting molecules through the formation of metallic electrodes. However, the fragile nature of molecules make it difficult to realize nondestructive metal/organic contacts when the metal electrode layers are fabricated by conventional methods of metal deposition, thereof the development of molecular nanodevices has been severely restricted. In this talk we will summarize the contribution from our project team towards the objectives of the TMS research group. A novel robust contact method based on strained and rolled-up nanomembranes will be introduced after shortly reviewing the state-of-art 'soft' contact techniques for molecular devices [3]. The fabrication of self-assembled-monolayer (SAM) diodes and spin-valves structures consisting of non-destructive (ferromagnetic) metal/organic interfaces will be demonstrated. Furthermore, the local investigation via atomic force microscope (AFM) techniques and the application of organic nanocrystal diodes for sensing NO_2 will be discussed [4, 5].

Keywords: Nanomembrane, Rolled-up technology, Organic nanostructure, Organic spin valves

References

[1] M. Ratner, Nat Nano, 2013, 8, 378.
[2] D. Xiang, et al., Chem. Rev., 2016, 116, 4318.
[3] C. C. Bof Bufon, et al., Nano Lett., 2011, 11, 3727.
[4] P. F. Siles, et al, Nanoscale, 2016, 8, 8607.
[5] A. R. Jalil, et al., Adv. Mater., 2016, 28, 2971.