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Special Issue Preface, DNA Based Sensors

DNA-based sensors belong to chemical sensors used in chemical/biochemical analysis. Among the biosensors generally, there are some specific features at these sensors regarding their use to the investigation of DNA itself, both its amount (concentration) and chemical/biochemical reactivity. With respect to this, the DNA biosensors represent irreplaceable testing devices. From the discovery of electrochemical activity of nucleic acids by Palecek at the end of the 1950‘s, huge progress can be observed, particularly at the development of electrochemical DNA biosensors based on the concept of chemically modified electrodes. Together with an economic prospect, these devices have already achieved extremely high analytical sensitivity detecting, for instance, femtograms of original genomic target DNA. Screening of host-guest interactions of the surface attached DNA has found an interest among pharmaceutical and medical chemists as well as in environmental research. High sensitivity typical for the detection of DNA structural changes and damage is of great and unique importance in various fields.

General trend to microfabrication concerns also recent development on this topic. For instance, miniaturized DNA chips were created, particularly regarding DNA hybridization. The DNA microarrays integrated in multiple biosensors should lead to the simultaneous analysis of samples with different analytes. Application of nanostructures has been shown as a way for significant enhancement of the sensitivity of the sensors. The development of single-use sensors based, for instance, on screen-printing technology is of practical interest for routine analysis.

Further increase of interest to DNA based sensors can be expected in near future together with a commercial production of these devices and their wide use. However, basic research is still necessary to improve the sensor technologies, sensing strategies as well as analytical instrumentations and procedures. Papers collected in this special issue are from good known labs and represent the directions mentioned above. I would like to thank the contributors and I hope that the special issue of our Sensors will stimulate an interest to both the DNA based devices and the Journal.

Prof. Dr. Jan Labuda
The Guest Editor