

Abstract

Hemocompatible Electrochemical Sensors for Continuous Monitoring of Blood Parameters †

Sascha Balakin ^{1,*}, Bergoi Ibarlucea ^{1,2}, Dmitry Belyaev ¹, Larysa Baraban ³, Stefanie Hänsel ⁴, Manfred Maitz ⁴, Carsten Werner ⁴ and Gianauelio Cuniberti ^{1,2}

¹ Institute for Materials Science and Max Bergmann Center for Biomaterials, Technische Universität Dresden, 01069 Dresden, Germany; bergoi.ibarlucea@tu-dresden.de (B.I.); dmitry.belyaev@tu-dresden.de (D.B.); gianauelio.cuniberti@tu-dresden.de (G.C.)

² Center for advancing electronics Dresden (CFAED), Technische Universität Dresden, 01069 Dresden, Germany

³ Helmholtz-Zentrum Dresden-Rossendorf, Institute of Radiopharmaceutical Cancer Research, 01328 Dresden, Germany; l.baraban@hzdr.de

⁴ Max Bergmann Center of Biomaterials Dresden, Leibniz Institute of Polymer Research Dresden, 01069 Dresden, Germany; haensel@ipfdd.de (S.H.); manfred@maitz-online.de (M.M.); werner@ipfdd.de (C.W.)

* Correspondence: sascha.balakin@gmail.com

† Presented at the 8th International Symposium on Sensor Science, 17–26 May 2021; Available online: <https://i3s2021dresden.sciforum.net/>.

Published: date

Abstract: Real-time monitoring of physiological parameters is essential for point-of-care testing. While nowadays routine tests are done through ex vivo analysis on frequently extracted blood, placing implantable sensors monitoring key blood parameters such as lactate, glucose, ions, and oxygen would suppose a giant step forward in the care of critically ill patients, improving the response time in emergencies and diminishing the invasiveness of the measurements. The recent advances in microelectronics and nanotechnology is a promising technology enabling moving in that direction. The goal of our work is to develop arrays of electrochemical sensors with selective and hemocompatible coatings, allowing future implementation of such measurements in patients. We perform the analysis of blood parameters in a label-free and electrochemical manner which is compatible with the inevitable miniaturization in a real application. The tuneable composition of the layer will allow to pursue further applications in the future by modification of the receptor molecules and their concentrations.

Keywords: blood gas analysis; physiological parameters; point-of-care; implantable sensor; hemocompatible coating; electrochemical detection; biosensor