

Diamond-Based Multi Electrode Arrays for Monitoring Neurotransmitter Release



Giulia Tomagra, Alfio Battiato, Ettore Bernardi, Alberto Pasquarelli, Emilio Carbone, Paolo Olivero, Valentina Carabelli and Federico Picollo

Abstract In the present work, we report on the fabrication of a diamond-based device targeted to the detection of quantal neurotransmitter release. We have developed Multi-electrode Arrays with 16 independent graphitic channels fabricated by means of Deep Ion Beam Lithography (DIBL). These devices are capable of detecting the in vitro exocytotic event from neurosecretory cells, while overcoming several critical limitations of standard amperometric techniques.

Keywords Diamond-based sensor · Electrochemical detection
Neuronal network · Ion beam lithography

G. Tomagra (✉)

Drug Science and Technology Department, University of Torino, Corso Raffaello 30, 10125 Torino, Italy
e-mail: gtomagra@unito.it

A. Battiato · P. Olivero · F. Picollo

Section of Torino, Istituto Nazionale di Fisica Nucleare (INFN), Via Pietro Giuria 1, 10125 Torino, Italy

E. Bernardi

Physics Department, University of Torino, Via Pietro Giuria 1, 10125 Torino, Italy

A. Pasquarelli

Institute of Electron Devices and Circuits, Ulm University, Albert Einstein Allee 45, 89069 Ulm, Germany

E. Carbone · V. Carabelli

Drug Science and Technology Department, Inter-departmental Center (NIS), University of Torino, Corso Raffaello 30, 10125 Torino, Italy

P. Olivero · F. Picollo

Physics Department, Inter-departmental Center(NIS), University of Torino, Via Pietro Giuria 1, 10125 Torino, Italy

© Springer Nature Switzerland AG 2019

B. Andò et al. (Eds.) *Sensors*, Lecture Notes in Electrical Engineering 539,
https://doi.org/10.1007/978-3-030-04324-7_17