

16Ch BDD-MEA devices: solid tools for the amperometric determination of serotonin released by exocytosis in human platelets

Rosalía González-Brito^{1,3}, Pablo Montenegro¹, Alicia Méndez¹, Ramtin E. Shabgahi²,
Alberto Pasquarelli² and Ricardo Borges^{1*}

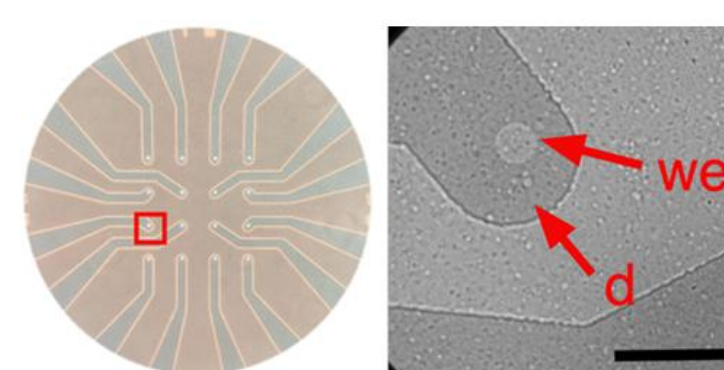
¹Pharmacology Unit, Medical School, Universidad de La Laguna, Spain; ²Institute of Electron Devices and Circuits, Ulm University, Germany; ³Organic Chemistry Department, Universidad de La Laguna, Spain
rgonzalb@ull.edu.es / ID sciforum-101906

INTRODUCTION & AIM

Serotonin is a neurotransmitter involved in the control and regulation of motor activity, body temperature, appetite, perception, cognitive function, sexual appetite, emotions and mood. It is important to know how serotonin is released directly in human cells.

Amperometry is an electrochemical technique that allows studying the release of oxidizable amines by exocytosis.

METHOD



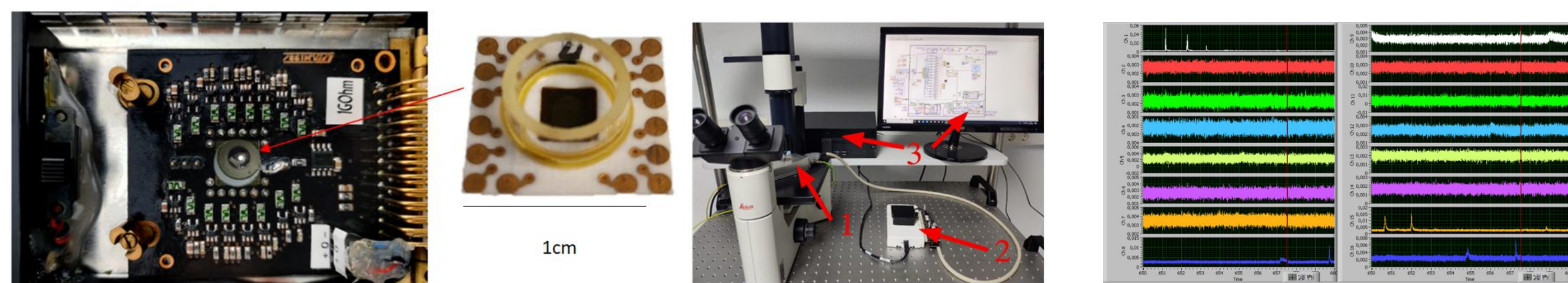
General view of the inside of the BDD-MEA wafer.

Left image: disposition of 16 microelectrodes.

Right: amplification of the previous picture showing one connector (**d**) and the active 20 μm diameter surface (working electrode, **we**).

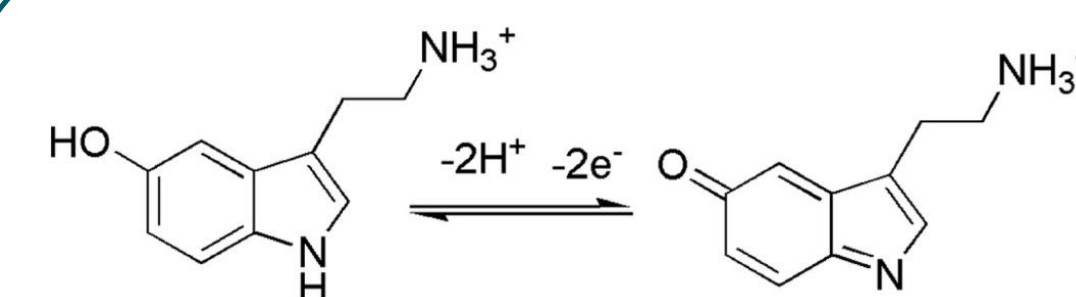
González-Brito et al. *Biosensors* 2023.

METHOD



Boron-doped Diamond Microelectrodes Array (BDD-MEA) system for the recording of amperometric signals from human platelets. Left: panel shows the electronic circuits and MEA device. Center: panel shows the general configuration (1. MEA into its Faraday's cage, 2. ADDA board and 3. the computer). Right: panel shows the signal acquisition and recording by 16 channel MEA system. Each spike corresponds to single exocytotic events observed on 6, 9 and 10 channels.

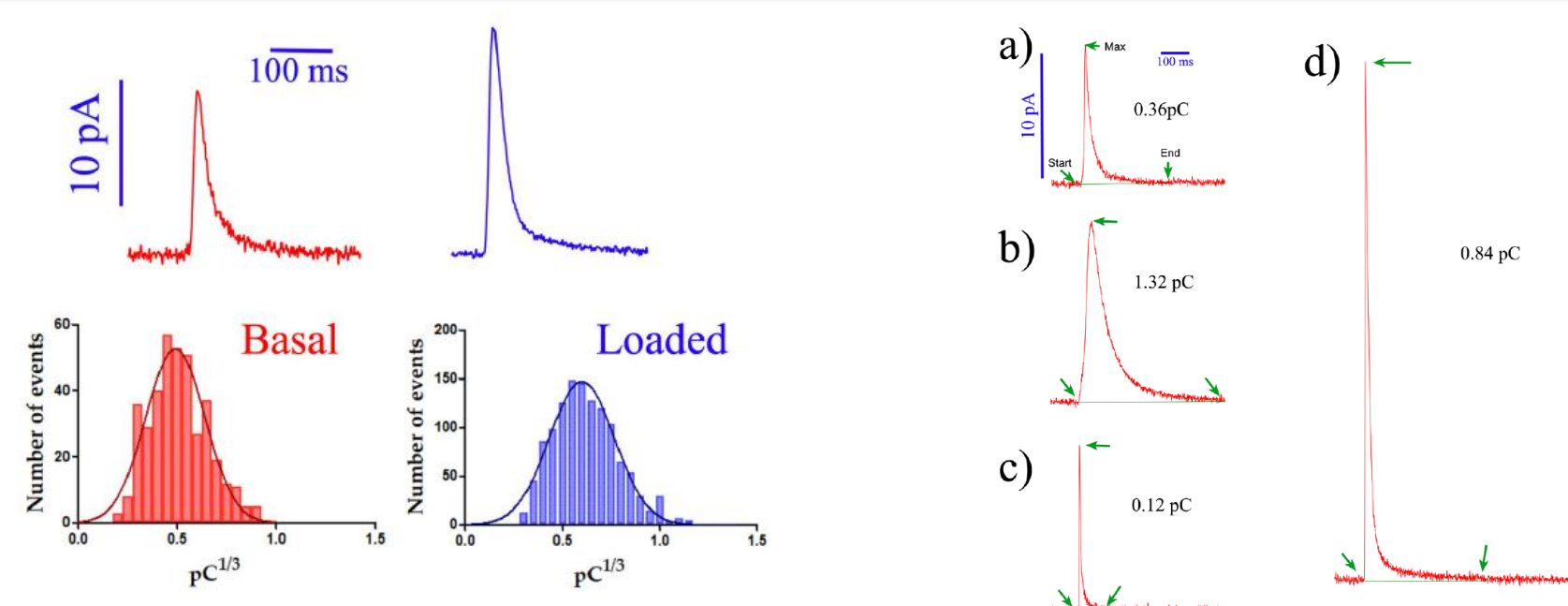
González-Brito et al. *Biosensors* 2023.



Electrochemistry detection of serotonin.

The electrode tips detects the electrical current generated by the electrons released during the oxidation of serotonin molecules. Electrode potential +800 mV

RESULTS & DISCUSSION



Left. Typical recordings obtained by averaging hundreds of spikes from 10 volunteers: under basal (**red**) and serotonin-loaded platelets (**blue**). **Right.** Examples of different types of peaks detected (a, b, c and d).

González-Brito et al. *Biosensors* 2024.

CONCLUSION

We demonstrate the effectiveness of BDD-MEA devices for the amperometrical detection of serotonin exocytosis from human platelets. **Supported by MICIIN. Grants # PID2020-116589GB 100 to RB.**

REFERENCES

[1] González Brito et al., *Biosensors* **2023**, *13*, 86.

[2] González Brito et al., R. *Biosensors* **2024**, *14*, 75.