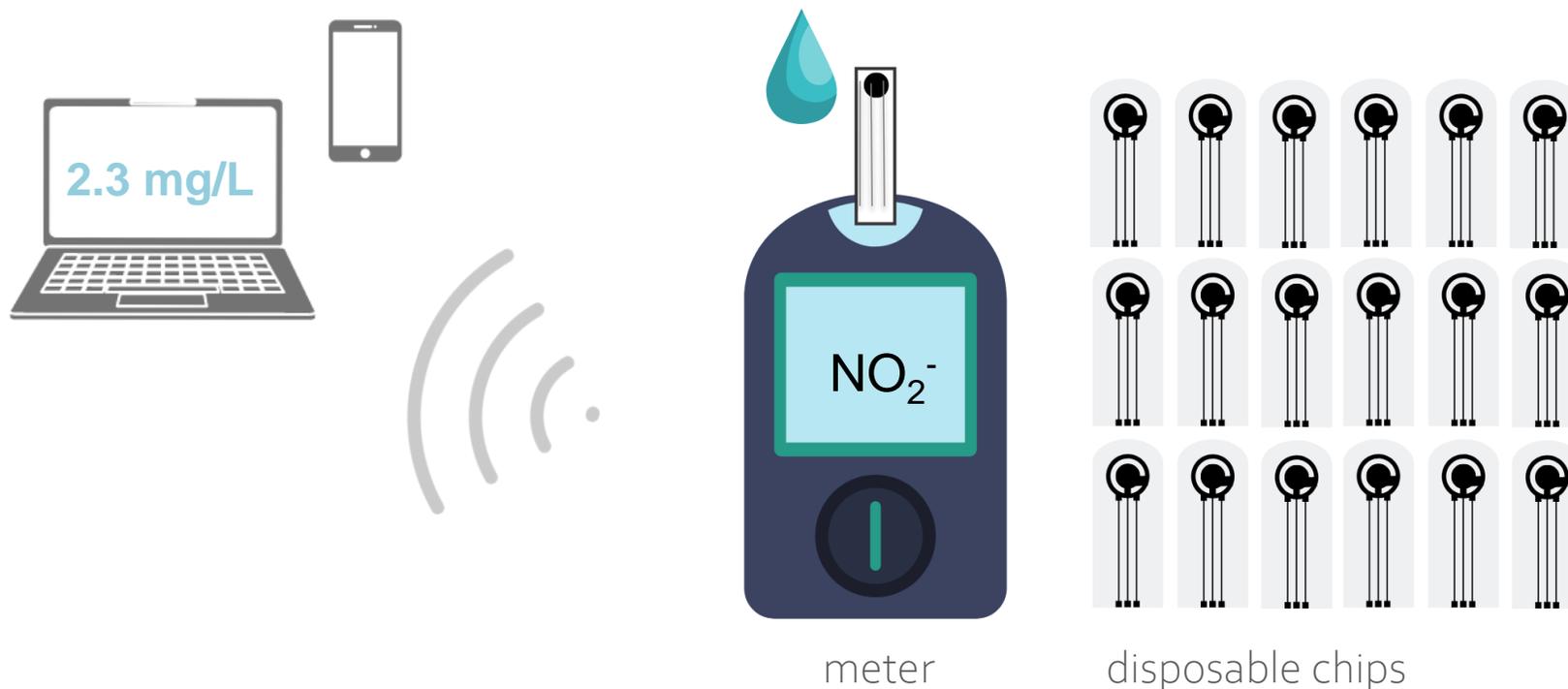


Development of smart devices to monitor *N*-based compounds: from the problem to the solution

M. Gabriela Almeida
galmeida@egasmoniz.edu.pt



Centro de investigação interdisciplinar Egas Moniz



SCIMAGO
INSTITUTIONS
RANKINGS

Portugal
2022

9th National
1st Private Institutions

THE "NITRITES" PROBLEM

ENVIRONMENT



Combustion



Nitrogen Fertilizers

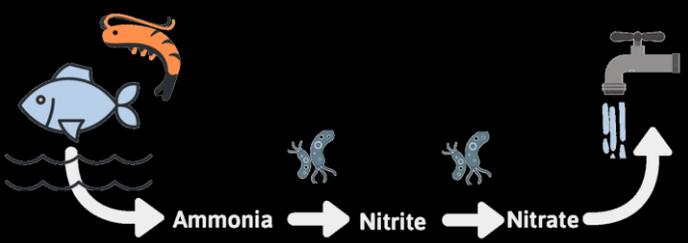


FOOD INDUSTRY



2006/52/EC:
Max. authorized in meat -
150 mg/Kg

AQUACULTURE



Ammonia → Nitrite → Nitrate

WATER BODIES

98/83/EC: 0.1 mg/L
in drinking water



Eutrophication



NITROGEN
CYCLE



HEALTH ISSUES



Methemoglobinemia



Carcinogenic
Nitrosamines

Health Hazards

BIOMARKER:

- Inflammation
- Infection



BIOMEDICINE:

- Periodontitis
- CVD
- Therapeutics



Clinical Analysis

THE “NITRITES” PROBLEM

Laboratory Assays



Ion chromatography



UV-Vis Spectrophotometry



Automated Wet Chemistry Analyzer

PROS: Analytical Accuracy

CONS (customers' pains):

- Off-site (sample collection)
- Laborious work
- Expensive Equipments
- Highly trained personnel

Portable Methods



Colorimetric Kits



Test Strips



Colorimetric Photometers



Ion-selective electrodes

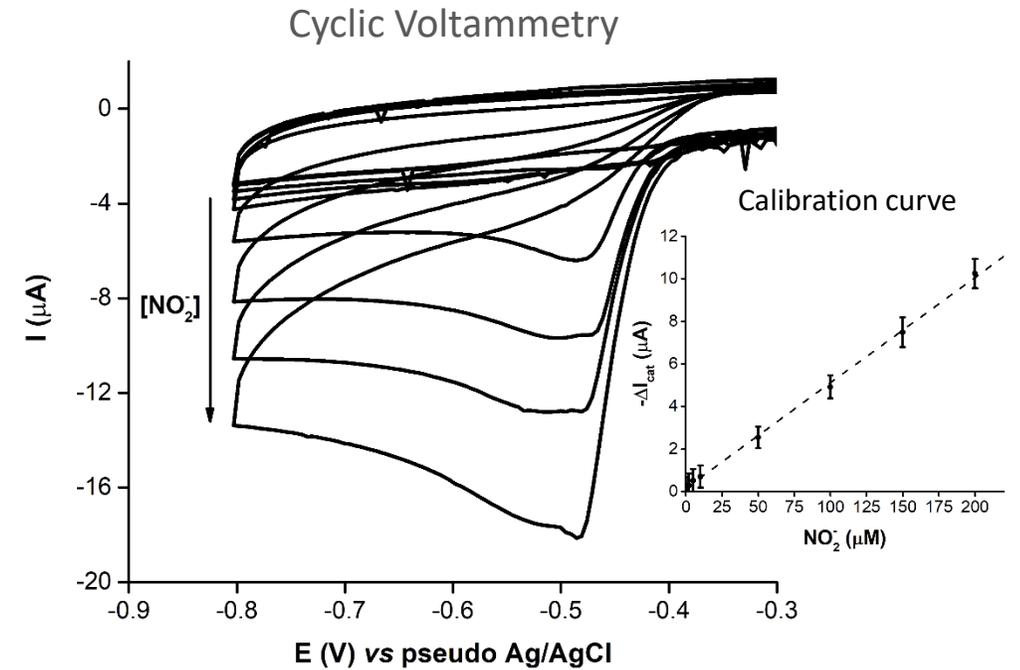
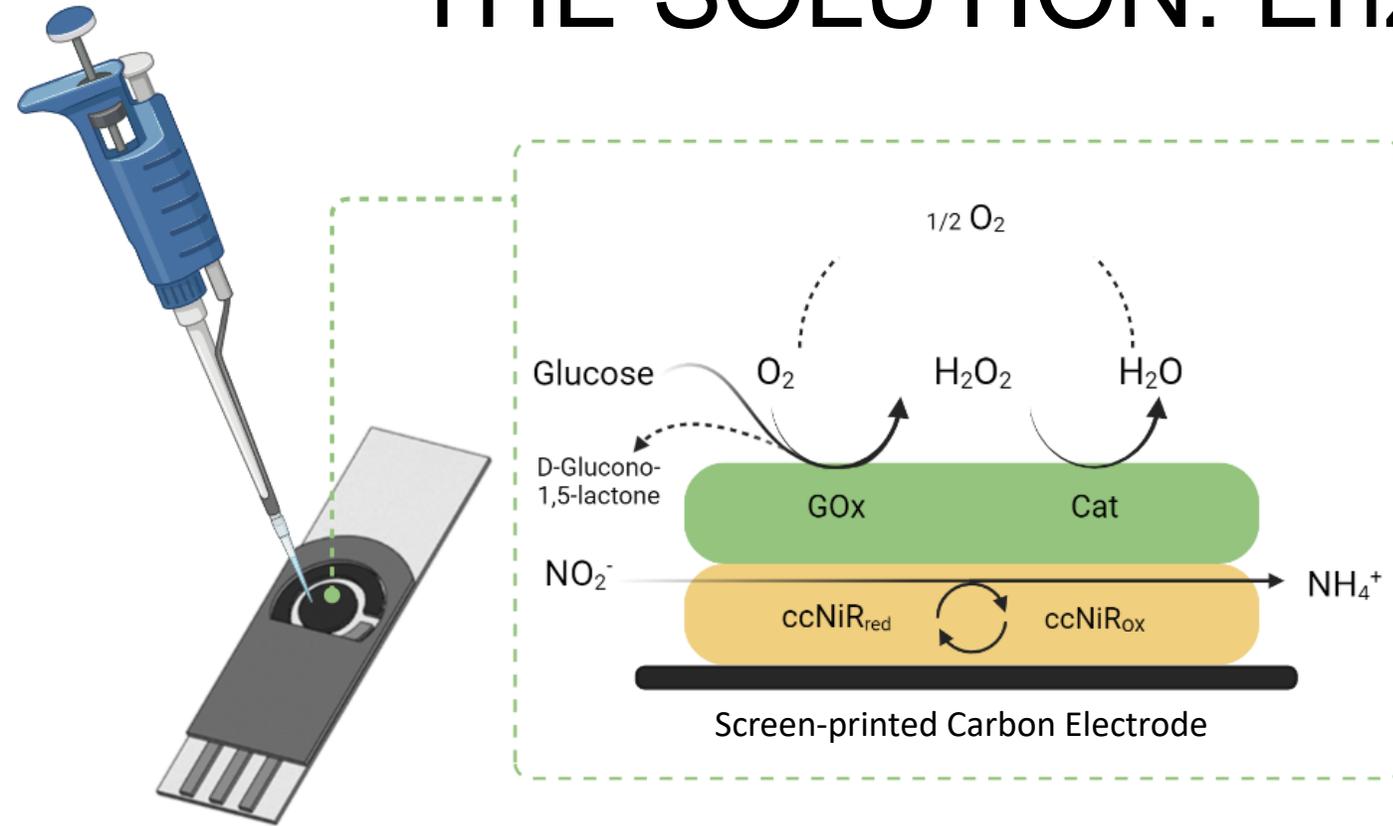
PROS:

- Quick response
- Easy to use

CONS (customers' pains):

- Lack of accuracy
- Prone to interferences
- Require frequent maintenance
- Require calibration
- Non-digitation

THE SOLUTION: Enzyme Biosensor



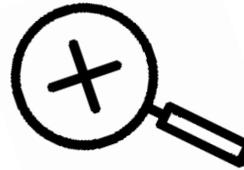
Benefits



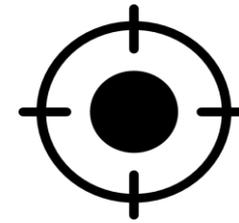
On-site



Fast



0.05-5.0 mg/L
Sensitive



Accurate



Calibration free

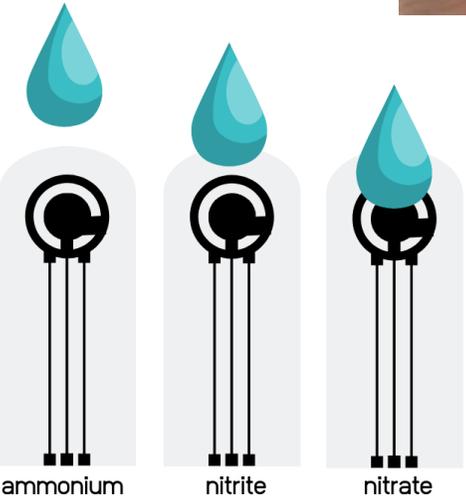
TECHNOLOGY TRANSFER



Iceland
Liechtenstein
Norway grants



App



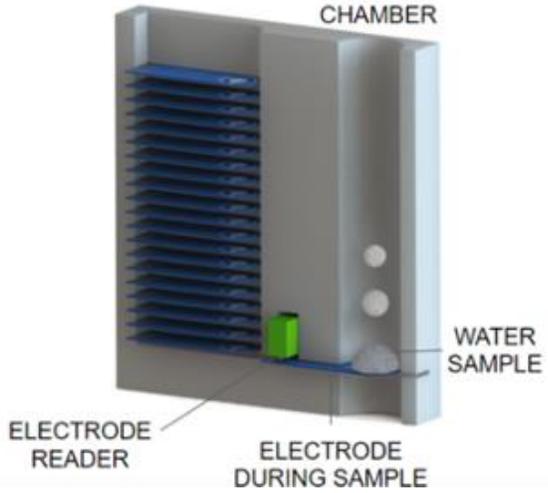
(disposable)



Sensing chips for NOx compounds



20x ELECTRODE MAGAZINE WATER SAMPLE CHAMBER



(automation system)

ACKNOWLEDGMENTS



<https://gb2g.webnode.pt>



<https://www.nitrogensing.com>

