

# Determination of nitrate and nitrite in human saliva with a specially designed microfluidic paper-based analytical device ( $\mu$ PAD)



CATÓLICA  
ESCOLA SUPERIOR  
DE BIOTECNOLOGIA

PORTO

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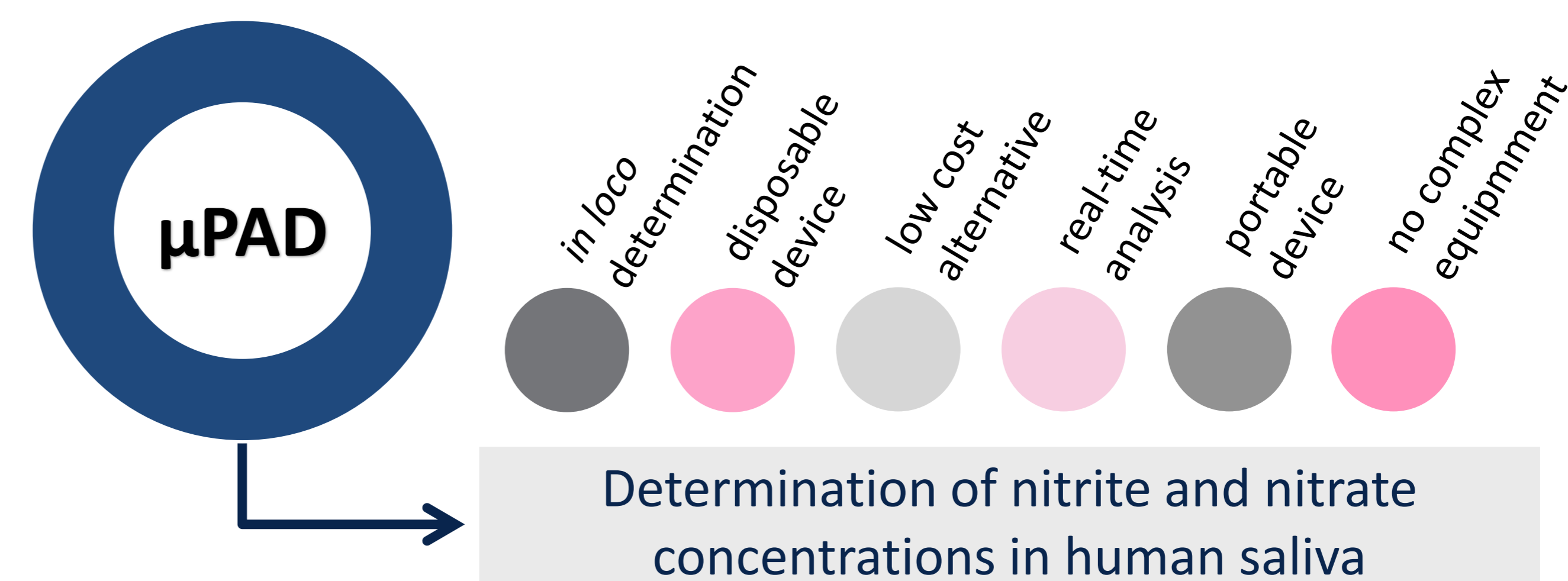
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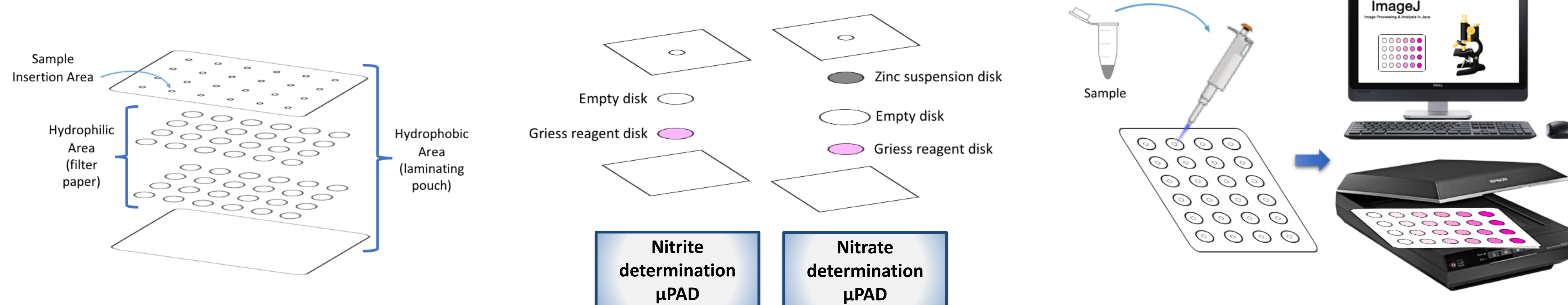
## Introduction

For many years, the concentration of nitrite and nitrate anions in human saliva was believed to be correlated with disfunctions and infections in the mouth. However, recent studies have reported some benefits to the presence of these ions in the oral cavity. In any case, there is a connection between the  $\text{NO}_x$  salivary concentration and the human health and therefore it has become more and more relevant to understand this connection. Nowadays, there are several methods that allow this determination for a number of concentration ranges and types of samples, but these methods have limitations like requiring high volume of reagents and sample, the time of analysis, the use of complex lab equipment, the need of constant power, specialized technicians, the production of toxic waste, among others.

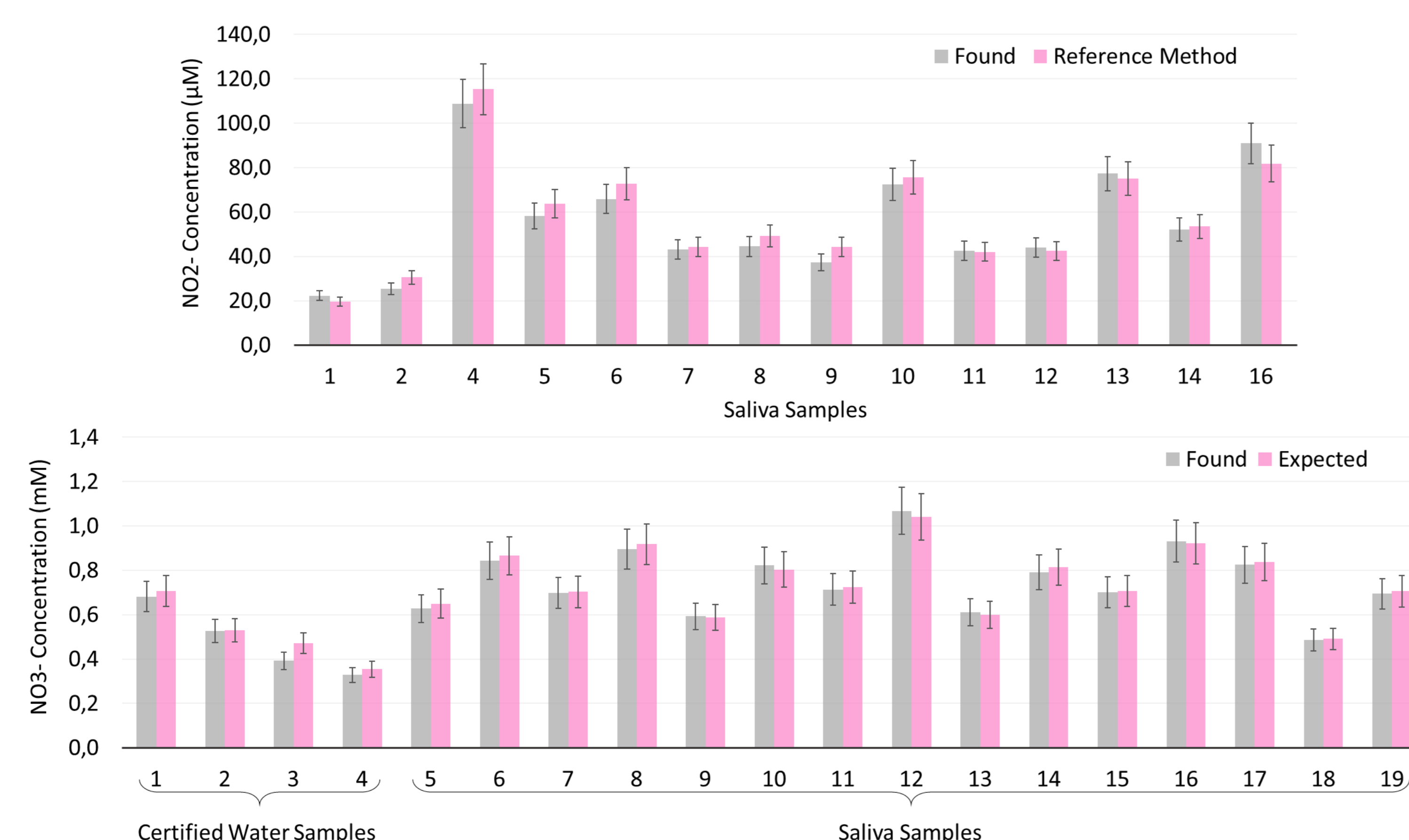
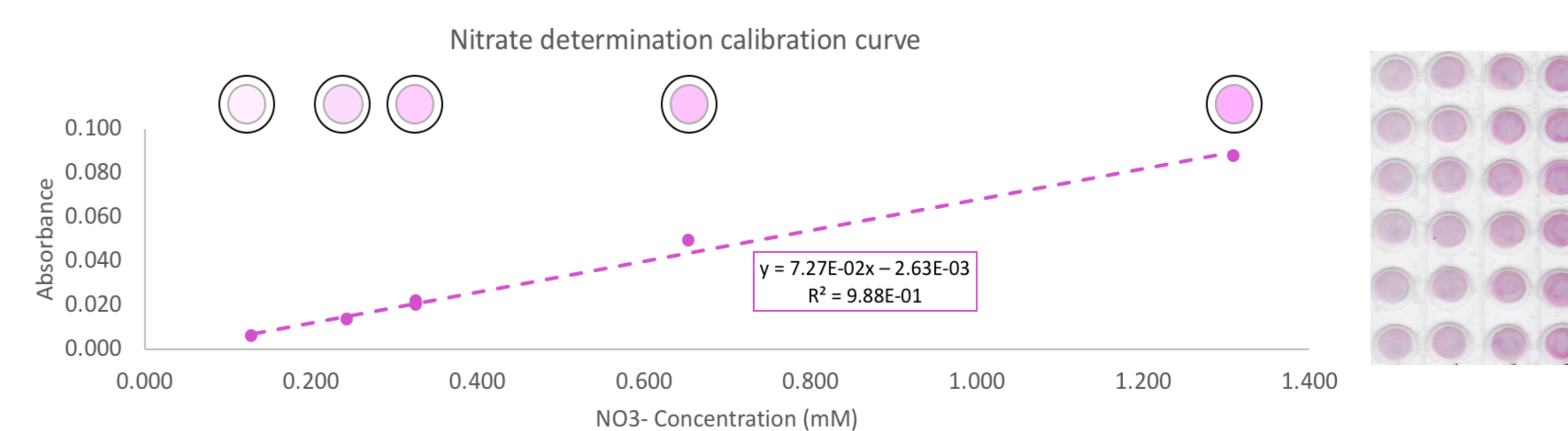
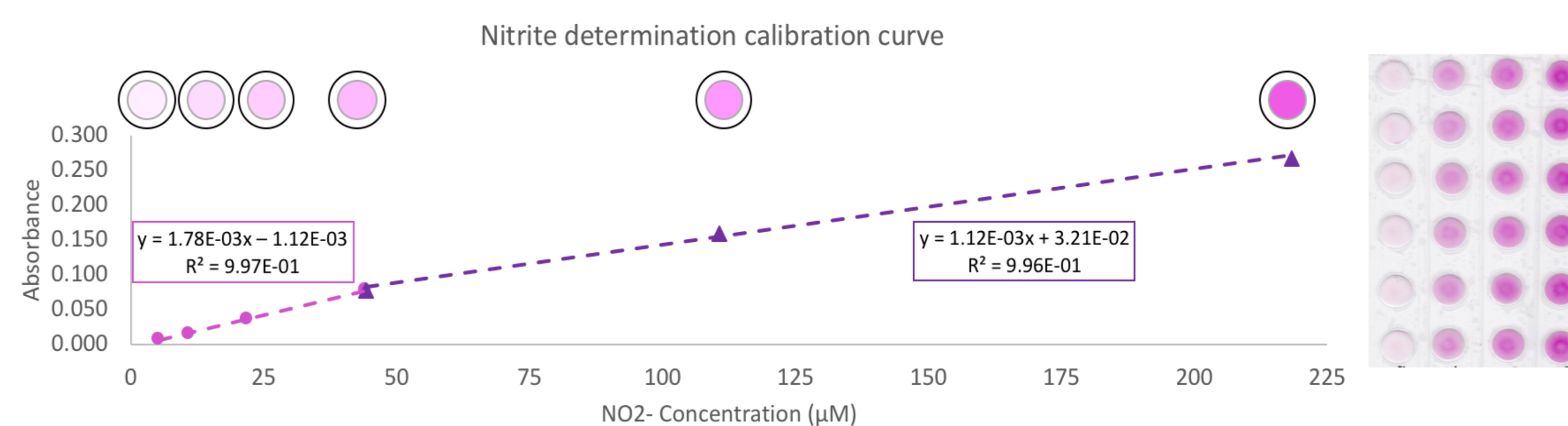
## Objectives



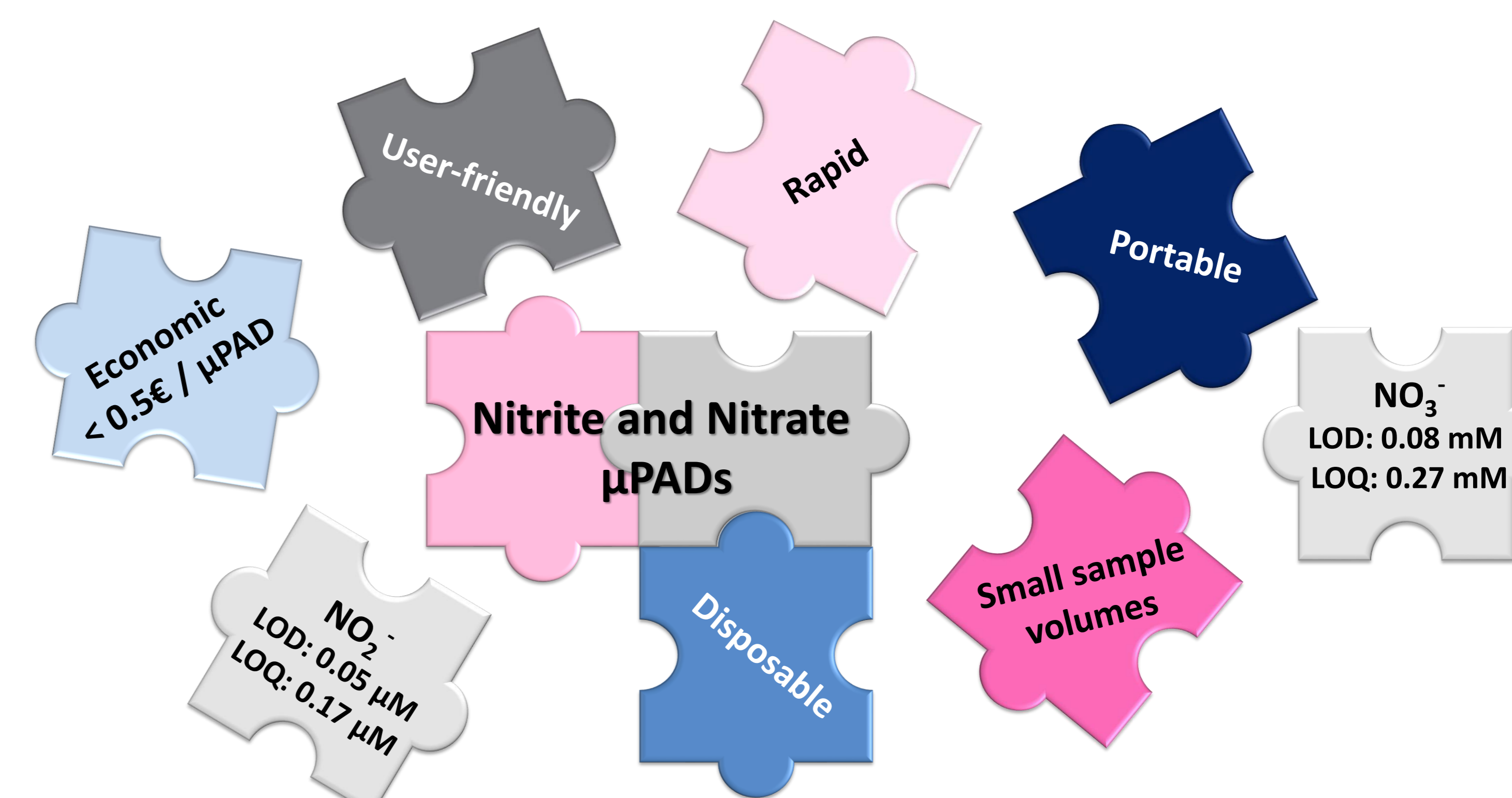
## Methods and Results



$\text{NO}_2^-$ Studies	Options	Chosen Feature	$\text{NO}_3^-$ Studies	Options	Chosen Feature
Number of layers	1 or 2 layers	2 layers	Number of layers	2 or 3 layers	3 layers
Griess Reagent layer	1 <sup>st</sup> or 2 <sup>nd</sup> layer	2 <sup>nd</sup> layer	1 <sup>st</sup> layer paper (zinc)	Whatman 1, 4 or 5	Whatman 1
1 <sup>st</sup> layer paper (empty)	Whatman 1, 4, 5, 42, 50 or 541	Whatman 1	2 <sup>nd</sup> layer paper (empty)	-	Whatman 1
2 <sup>nd</sup> layer paper (reagent)	Whatman 1, 42, 50 or 541	Whatman 50	3 <sup>rd</sup> layer paper (reagent)	Whatman 1, 42, 50 or 541	Whatman 50
Reagent volume	5 $\mu\text{L}$ or 10 $\mu\text{L}$	5 $\mu\text{L}$	Reagent volume	5 $\mu\text{L}$ or 10 $\mu\text{L}$	10 $\mu\text{L}$
Sample volume	10 $\mu\text{L}$ , 15 $\mu\text{L}$ or 20 $\mu\text{L}$	15 $\mu\text{L}$	Sample volume	15 $\mu\text{L}$ , 20 $\mu\text{L}$ , 25 $\mu\text{L}$ or 30 $\mu\text{L}$	25 $\mu\text{L}$
Scanning window (after use)		20 min – 4h	Scanning window (after use)		20 min – 2h
Storage stability (before use)		Vacuum for 7 days (study in progress)	Storage stability (before use)		Vacuum for a 14 days in refrigerator



## Conclusions



## Acknowledgements

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