



Sistemas de detección de ADN y patógenos basados en nanomateriales con puertas moleculares

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INFECTIOUS DISEASES CAUSE AROUND 25,000
DEATHS IN EUROPE EACH YEAR




LATE OR INCORRECT DIAGNOSIS OF AN
INFECTION MAY LEAD TO:

- INAPPROPRIATE TREATMENT
- COMPLICATIONS OF THE DISEASE
- LONG TERM HOSPITALIZATIONS

DEVELOPMENT OF RAPID DIAGNOSTICS SYSTEMS COULD
IMPROVE THE ABILITY TO INTERVENE RAPIDLY AND POTENTIALLY
REDUCE MORTALITY OF INFECTIOUS DISEASES.



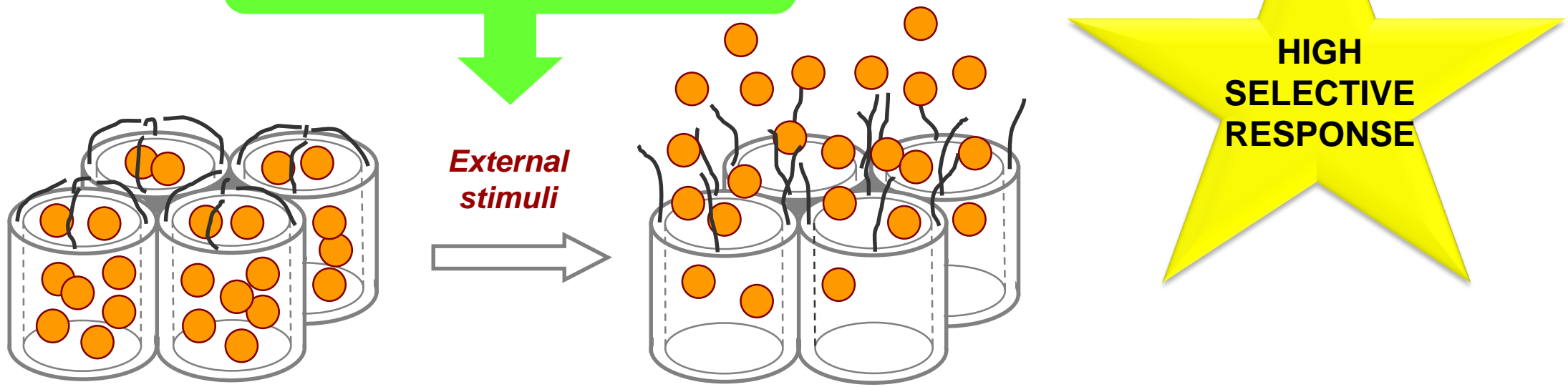
End users and beneficiaries



Low cost

Easy market penetration

the presence of a **TARGET GUEST**
triggers the delivery of a reporter

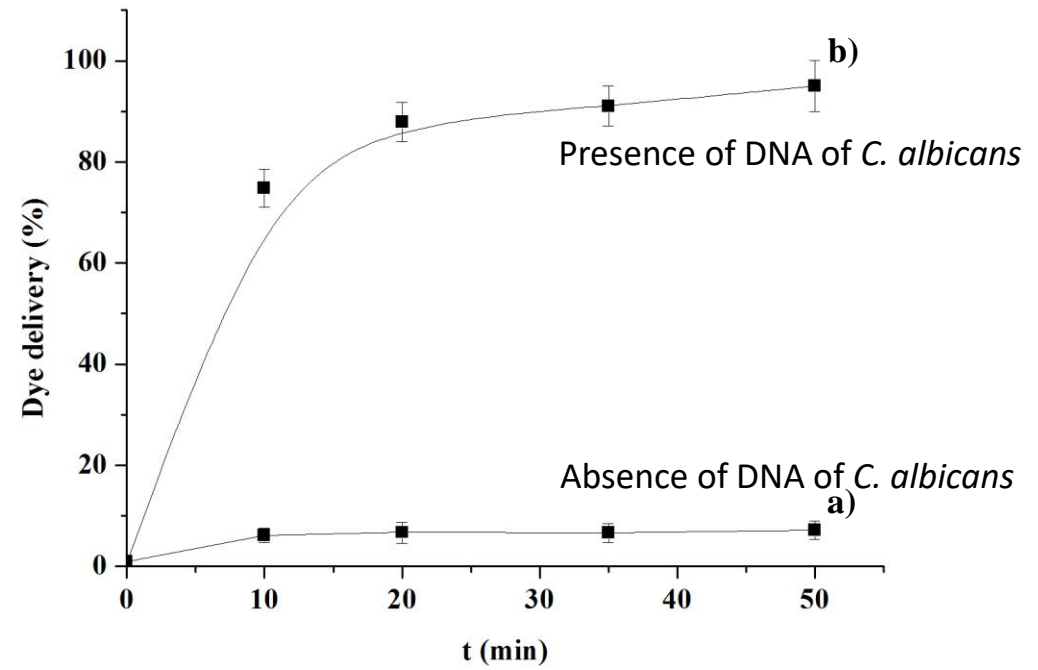
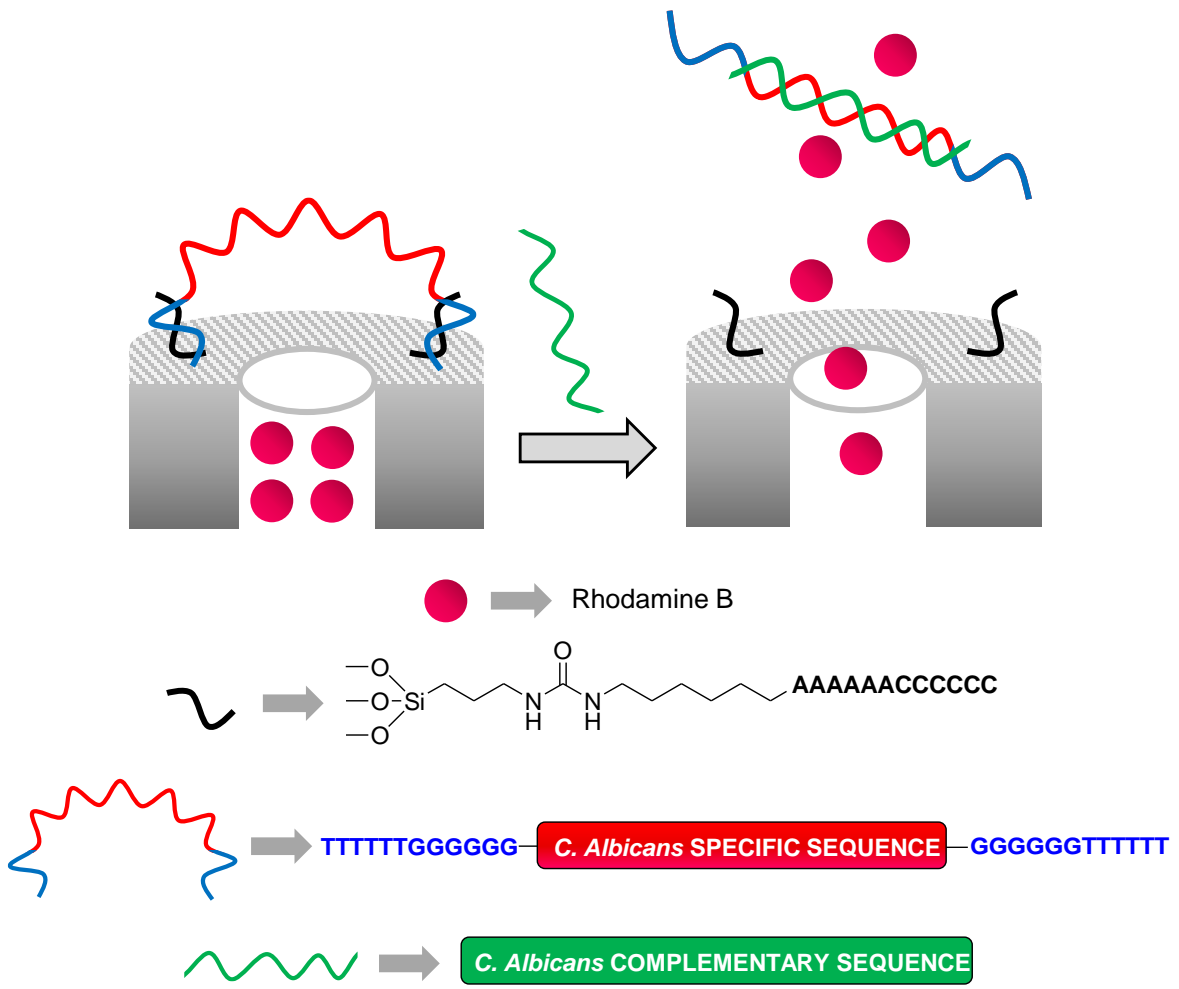


F. Sancenón et al., ChemistryOpen, 2015, 4, 418;

E. Aznar et al. Chem. Rev. 2016, 116, 561;

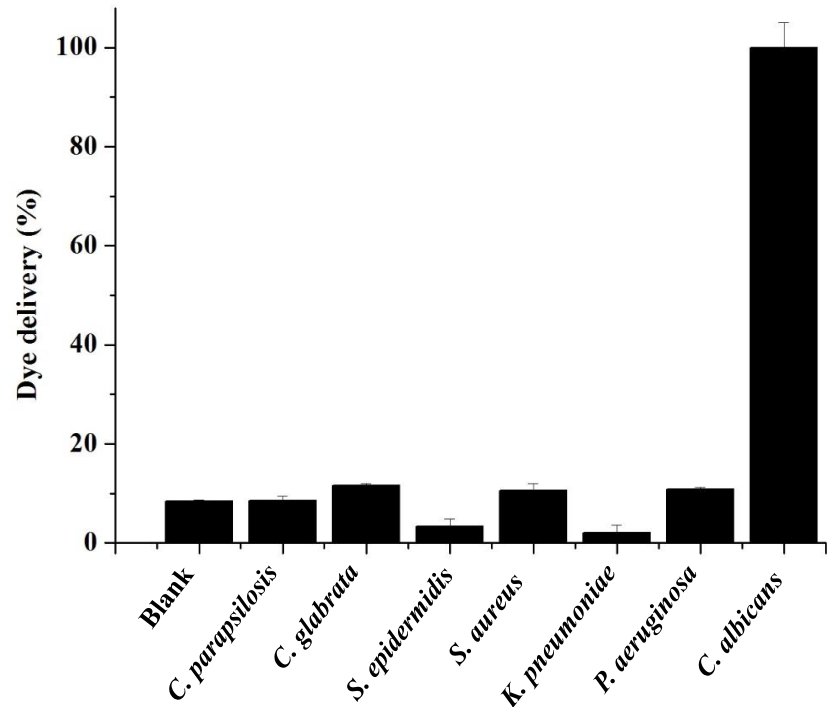
A. García-Fernández et al. Small 2020, 16, 1902242

Gated materials for DNA of *Candida albicans* detection

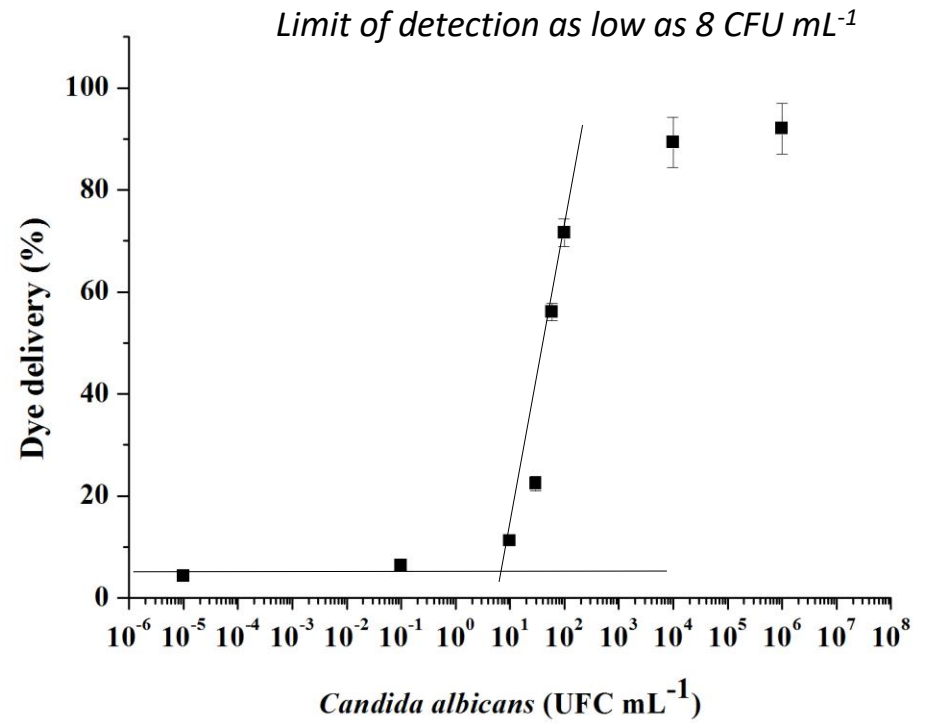


Release profile of rhodamine B from gated solid in the absence (a) and in the presence (b) of genomic DNA of *C. albicans* ($1 \times 10^{-3} \mu\text{g mL}^{-1}$) in TRIS-HCl buffer (pH 7.5).

Gated materials for DNA of *Candida albicans* detection



Release of rhodamine B from gated solid in the absence (blank) and in the presence of different DNA pathogens in TRIS-HCl buffer (pH 7.5).



Release of rhodamine B in the presence of different concentrations of *C. albicans* in TRIS-HCl buffer (pH 7.5).

Gated materials for DNA of *Candida albicans* detection

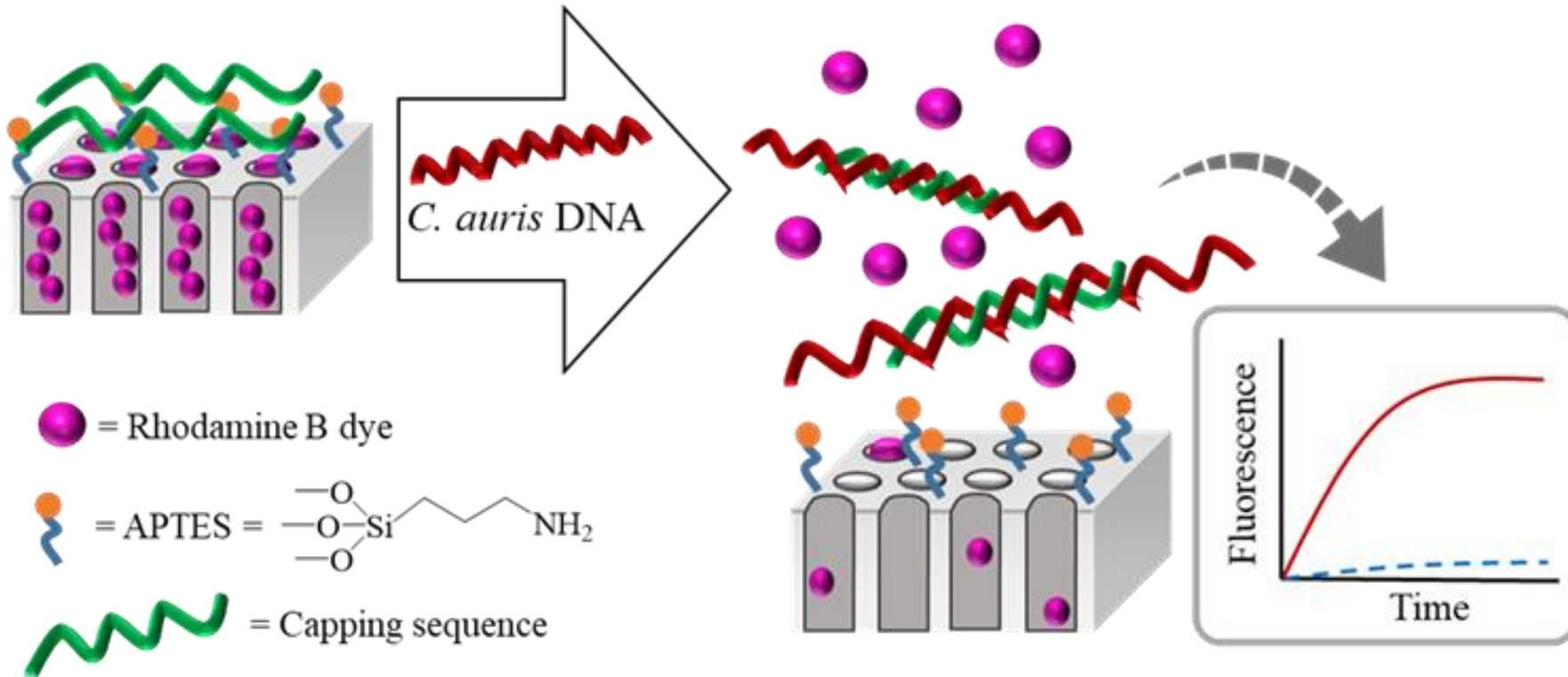
Analyzed Samples	86 (50 positive, 36 negative)
Type	Blood Cerebrospinal fluid Peritoneal Fluid Gynecological Related with bone infection Pleural exudate
Positive	44
Negative	36
False positive	0
False negative	6
Sensitivity	88%
Especificity	100%

Similar LODs

Significantly faster

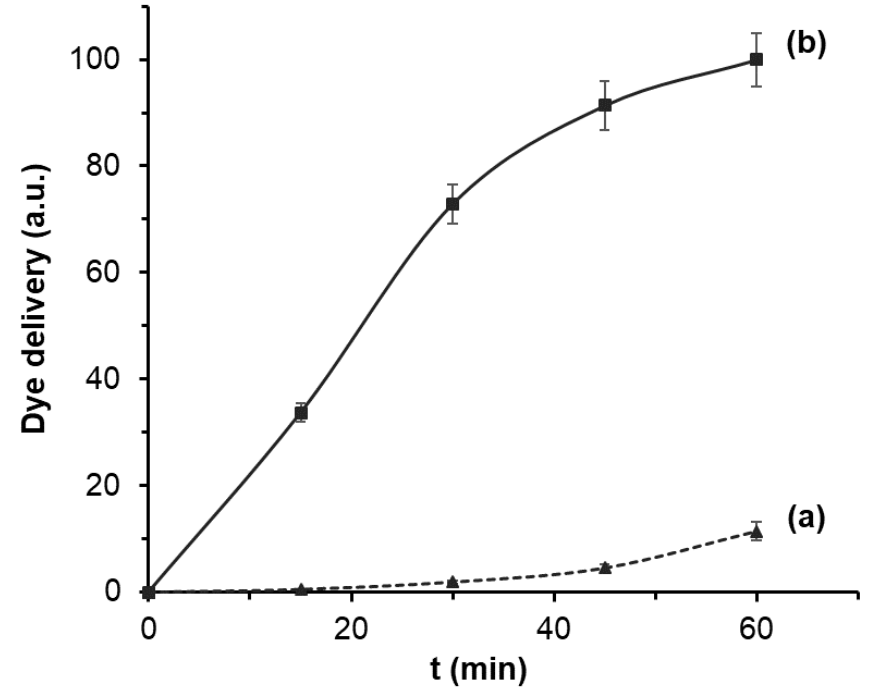
(an overall assay time of ca. 30 min compared to ca. 12 hours for PCR-based method or to ca. 37.6 hours for blood culture)

Gated materials for DNA of *Candida auris* detection

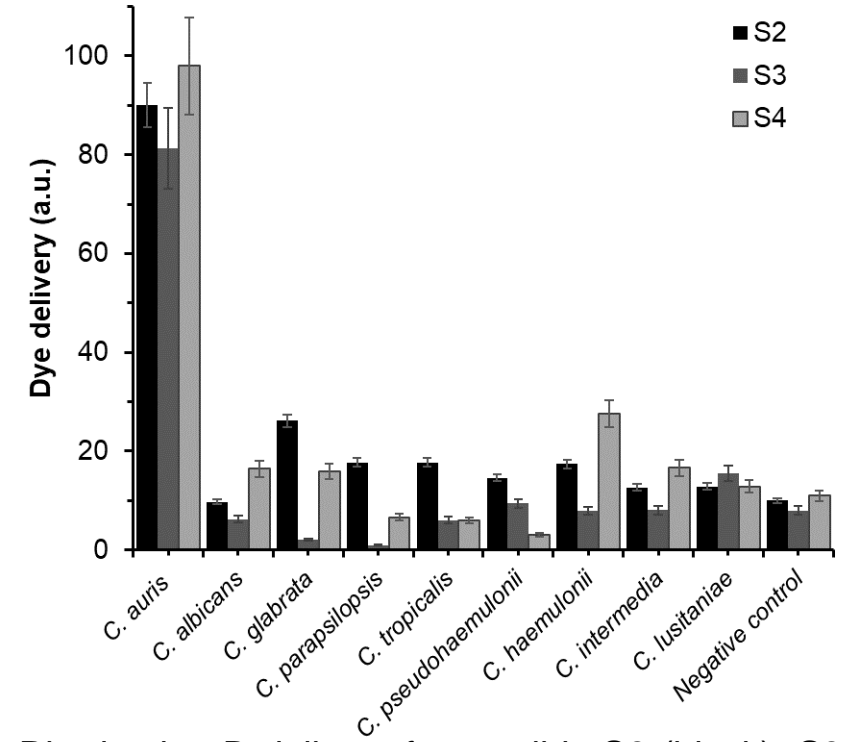


Delivery of the entrapped dye is selectively accomplished by the presence of genomic DNA from *C. auris*

Gated materials for DNA of *Candida albicans* detection



Rhodamine B delivery profile from **S4** in the absence (a) and in the presence (b) of 100 ng of denatured genomic DNA of *C. auris* in hybridization buffer (20 mM Tris-HCl, 37.5 mM MgCl₂, pH 7)



Rhodamine B delivery from solids **S2** (black), **S3** (dark grey) and **S4** (light grey) in the presence of 1 ng μL^{-1} of genomic DNA of *different pathogens*. Fluorescence was measured after 60 min in hybridization buffer at pH 7.5.

Gated materials for DNA of *Candida albicans* detection

Analyzed Samples	22 (17 positive, 5 negative)
Type	Blood culture
Positive	14
Negative	5
False positive	0
False negative	3
<hr/>	
Sensitivity	85%
Especificity	100%

**Reduction on
diagnosis time**

*From 3-4 days
to 1 hour*

**High
sensibility**

<10 CFU/mL

Cost reduction

20 euro/test

Ease of use

*Non trained
personnel*

- ***Staphylococcus aureus*** (*Sensors & Actuators B: Chemical*, **2020**, 320, 128281)
- ***Pneumocystis jirovecii*** (*Journal of Fungi*, **2020**, 6, 292)
- ***IDH1-R132H mutation in gliomas*** (*Sensors & Actuators B: Chemical*, **2021**, 345, 130406)
- ***8-oxo-dG cancer biomarker*** (*Nanoscale*, **2021**, 13, 8648)



Thank you!!



RTI2018-100910-B-C41,
PID2021-126304OB-C41



PROMETEO 2018/024,
CIPROM/2021/007



CANDI-EYE

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