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DELIVERABLE 2.9:
First printed sensing functions (public version)

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Responsible partner:	CSIC
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Type1[1]:	**R**
Dissemination Level[2]:	PU

[1] **Type**: Use one of the following codes (in consistence with the Description of the Action):
- R: Document, report (excluding the periodic and final reports)
- DEM: Demonstrator, pilot, prototype, plan designs
- DEC: Websites, patents filing, press & media actions, videos, etc.
- OTHER: Software, technical diagram, etc.

[2] **Dissemination level**: Use one of the following codes (in consistence with the Description of the Action)
- PU: Public, fully open, e.g. web
- CO: Confidential, restricted under conditions set out in the Model Grant Agreement
- CI: Classified, information as referred to in Commission Decision 2001/844/EC

DELIVERABLE D2.9: First printed sensing functions

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1. DOCUMENT HISTORY

Version	Date	Authors/ who took action	Comment	Modifications made by
0.1	27.07.2022	Gabriel Alfranca, Jesús Martínez de la Fuente, Carlos Sánchez Somolinos (CSIC)	First draft sent to PIs	
1.0	29.07.2022	Carlos Sánchez Somolinos (CSIC)	Submitted to Commission	

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2. RESULTS AND OUTLOOK

PRIME targets to integrate new ultra-sensitive and selective sensors in the chip and readable with light. The final device will be remotely addressed and read using simple photonic elements that can be integrated in compact, portable, and low-cost operation-and-read devices.

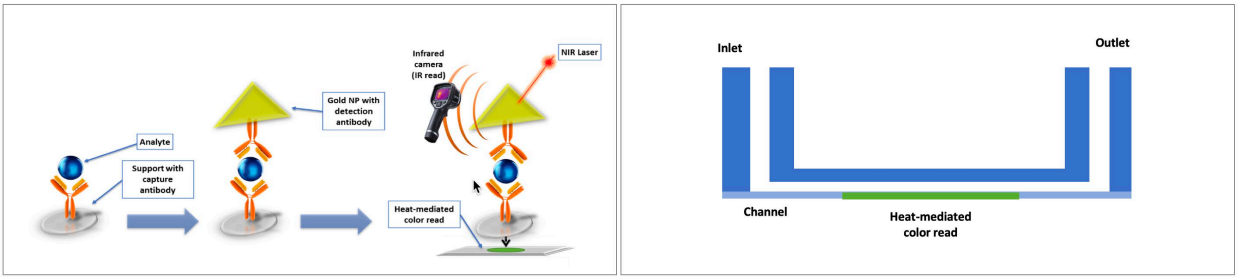

Figure 1, (left) PRIME nanoparticle-based sensor with a colorimetric thermal transducer and (right) channel-like sensor configuration.

In the course of this task we have designed and prepared a prototype of the PRIME sensing function. The preparation of the channel structures within a microfluidic chip has been undertaken and functionalization protocols have been adapted to provide the channel with analyte-capturing antibodies (Figure 1). This channel in combination with the plasmonic nanoparticles provided with detection antibodies has demonstrated the possibility to lead, in the presence of an analyte, to heat that can change the colorimetric thermal transducer (CTT) developed at PRIME, which is the optical detection element.

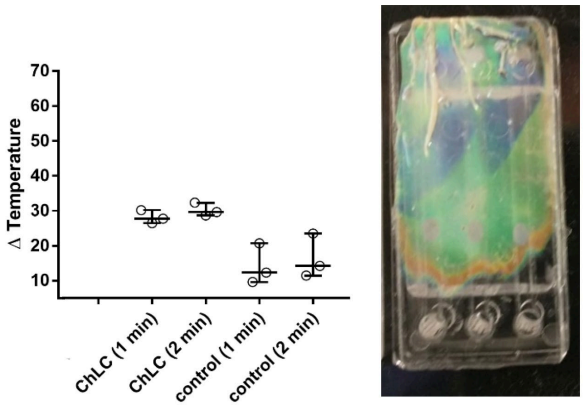

Figure 2, Validation of the immunoassay. The test was done the PRIME CTT with an internal control. All samples were run in triplicate..

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We have demonstrated at this stage the sensing concept using the PRIME CTT. The functional prototype of the sensing chips with PRIME CTT has demonstrated limits of detection of Carcinoembryonic Antigen (CEA) in the order of 1000 ng/mL Despite this the present microfluidic chip constitutes a demonstrator of the sensing function in the chip, we consider that there is room for improvement. The main remaining challenge at this stage would be to produce enough heat on the immunoassay to be able to induce a change in the color of the CTT. Improvements of these aspects are in progress within the framework of the project.

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