



Screening of specific aptamers for *Bacillus cereus* by Surface Plasmon Resonance imaging (SPRi)

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Screening of specific aptamers for *Bacillus cereus* by Surface Plasmon Resonance imaging (SPRi)

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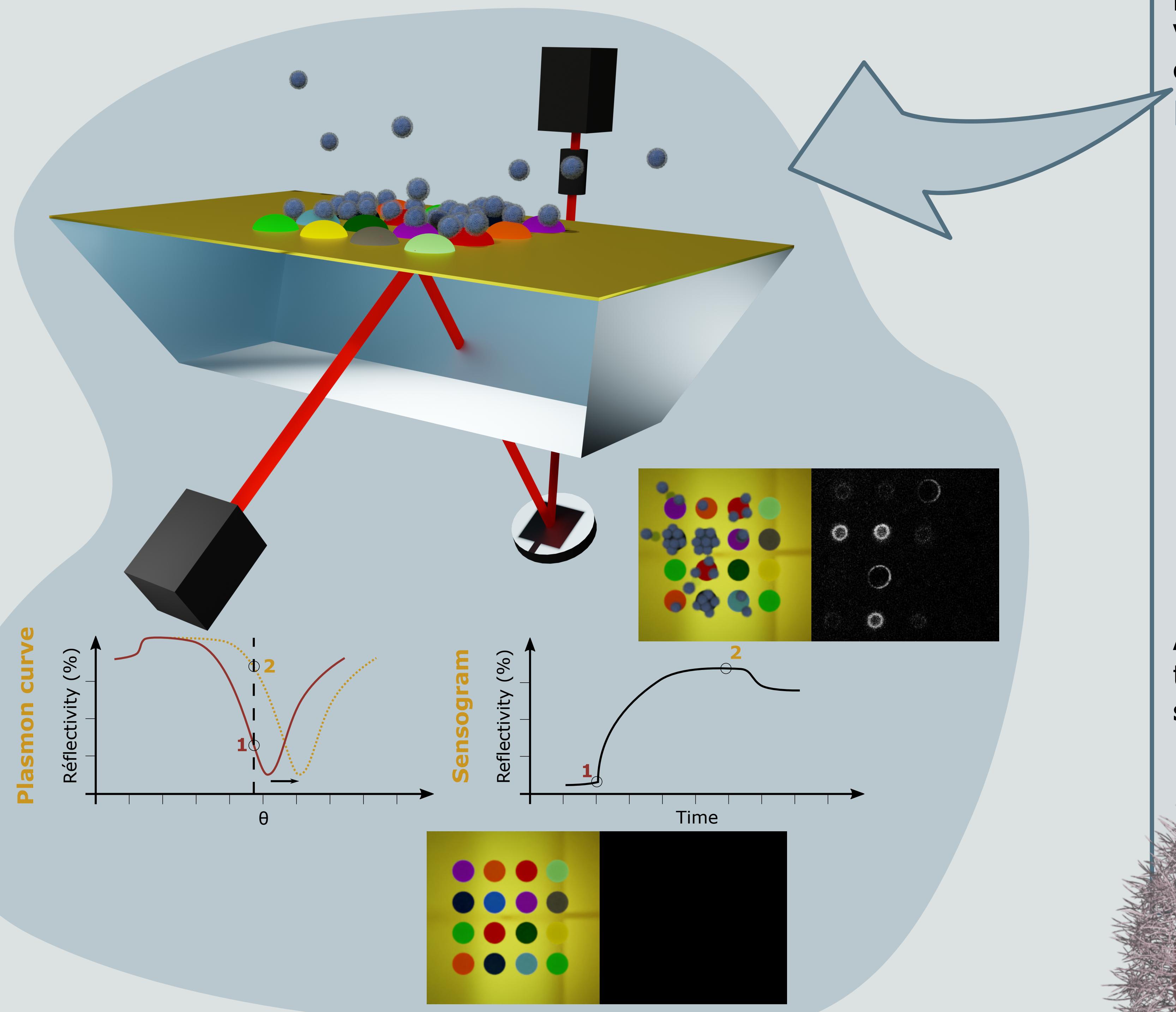
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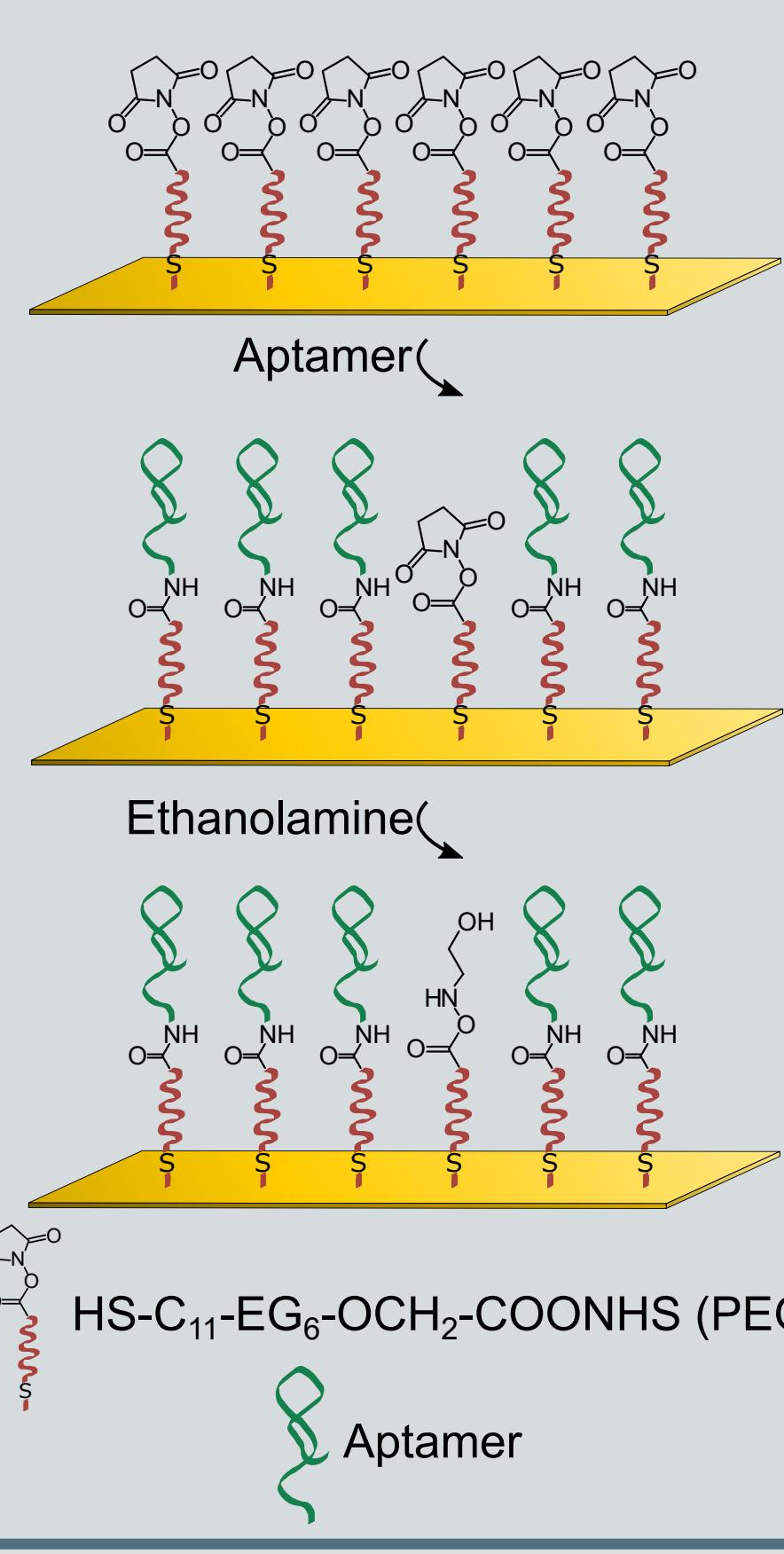
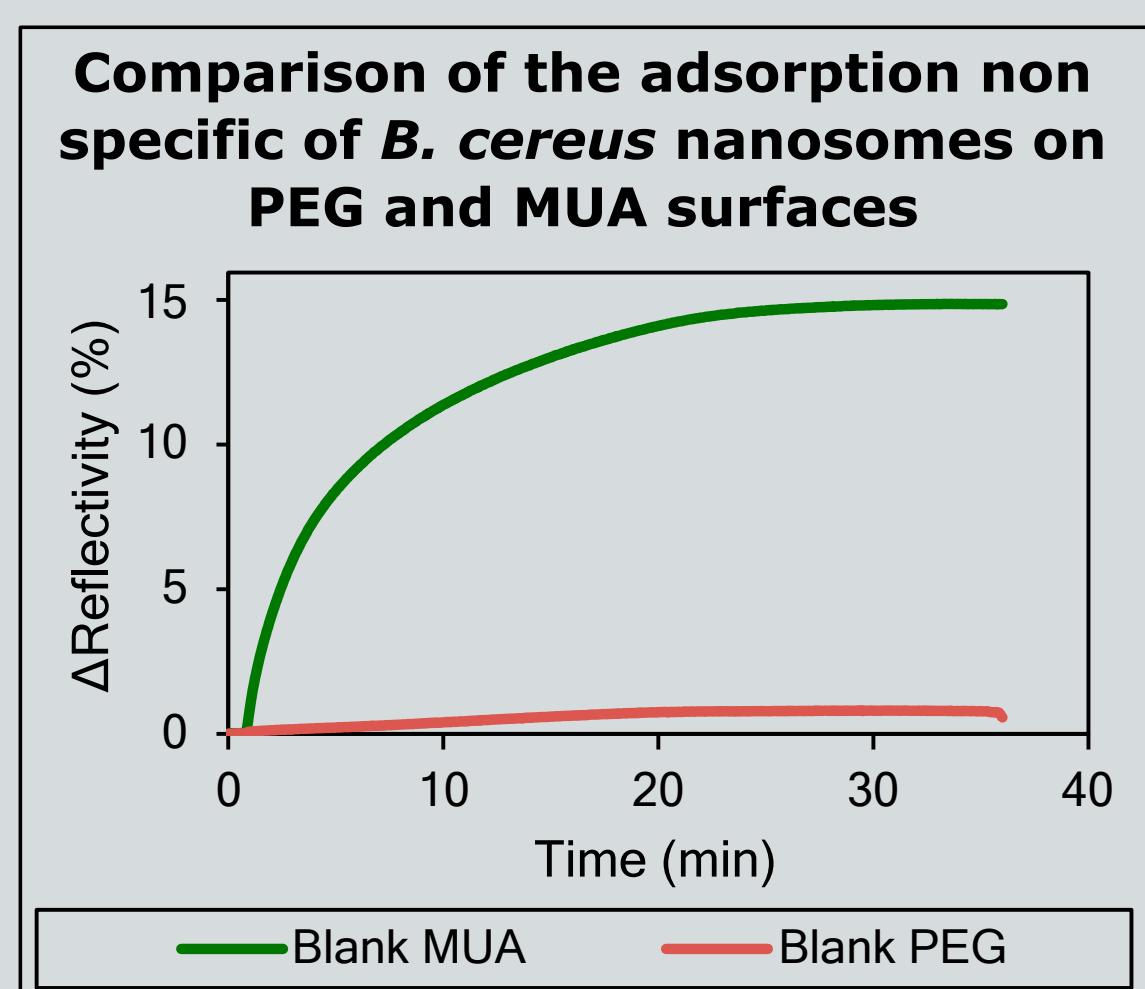
INTRODUCTION

Bacillus cereus is a food poisoning bacterium present in dairy products. To detect it, antibody based biosensors are efficient but available antibodies are expensive and may cross-react with other *Bacillus* species. Aptamers are a good alternative to these issues. Herein, seven aptamer sequences derived from the literature^(1,2) are compared and their specificity to *B. cereus* is assessed versus *Escherichia coli* and *Bacillus subtilis* by Surface Plasmon Resonance imaging (SPRi).



GRAFTING STRATEGY

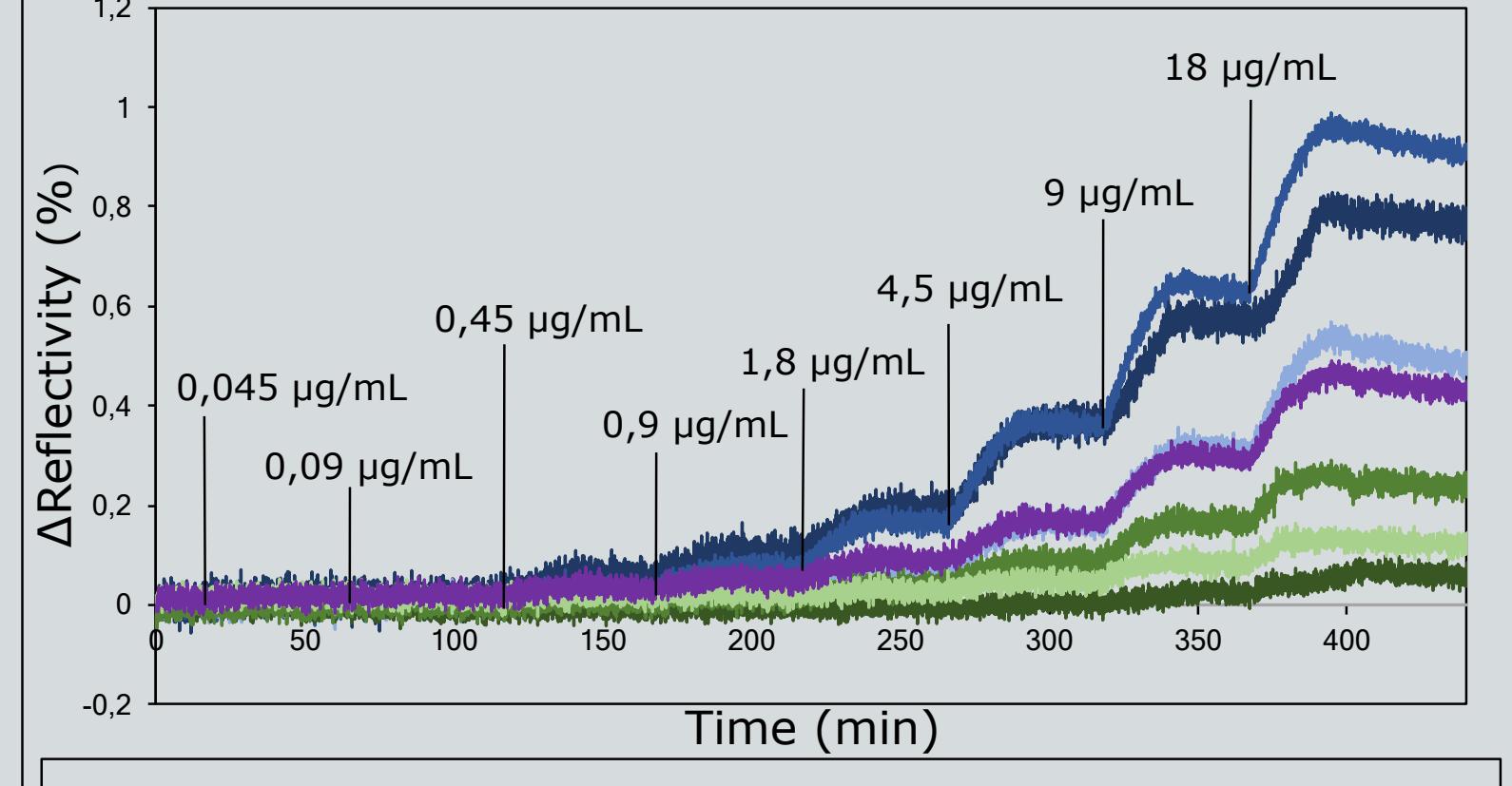
Two grafting strategies were explored: the EDC/NHS reaction was carried out on either a 11-mercaptopoundecanoic acid (MUA) or HS-C₁₁-EG₆-OCH₂-COONHS (PEG) self-assembled monolayer (SAM).



Aptamer affinity towards *B. cereus* was explored by cumulated injections of its nanosomes.

Specificity is assessed versus *E. coli* and *B. subtilis*.

Cumulated injections of *B. cereus* nanosomes by increasing protein concentration



Conclusion and perspectives

The aptamers SP15L and SP15M show the higher affinity for *B. cereus* and they contain both the G-quadruplex. SP16S, M and L have a lower affinity for *B. cereus*. The higher the aptamer density, the better the specificity seems to be.

The truncated aptamer SP15M showed good affinity for *B. cereus* nanosomes. A sequence containing only the G-quadruplex will be tested. Nanosomes will be further characterized by Cryo-TEM and NTA.

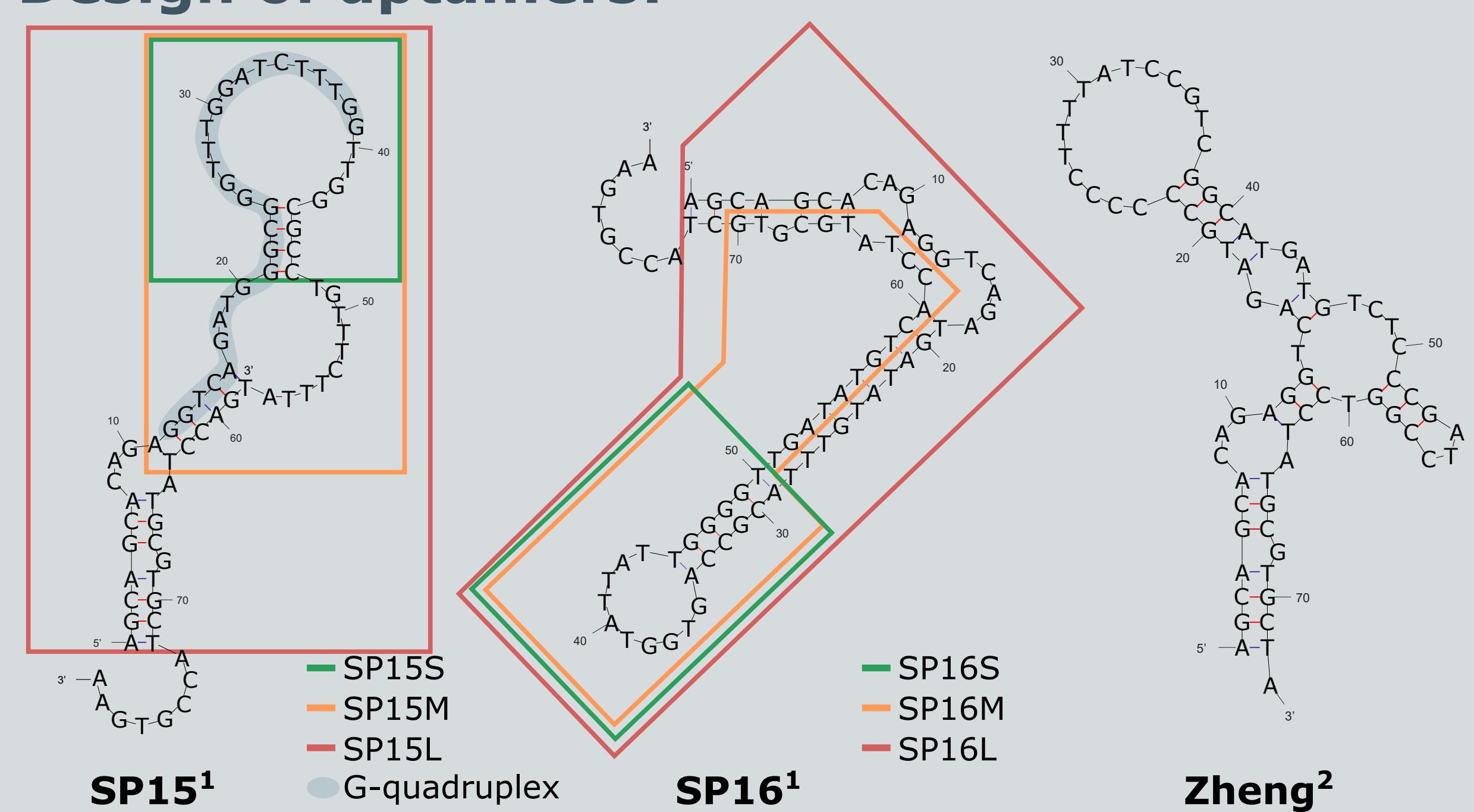
MATERIALS AND METHODS

SPRi principle:

Surface plasmon is an electromagnetic wave at the surface of a thin layer metal - here gold - generated when polarized light hits the surface. At a specific incidence angle, the plasmon waves resonate with the incidence light resulting in a dip of reflectivity: it is the resonance peak.

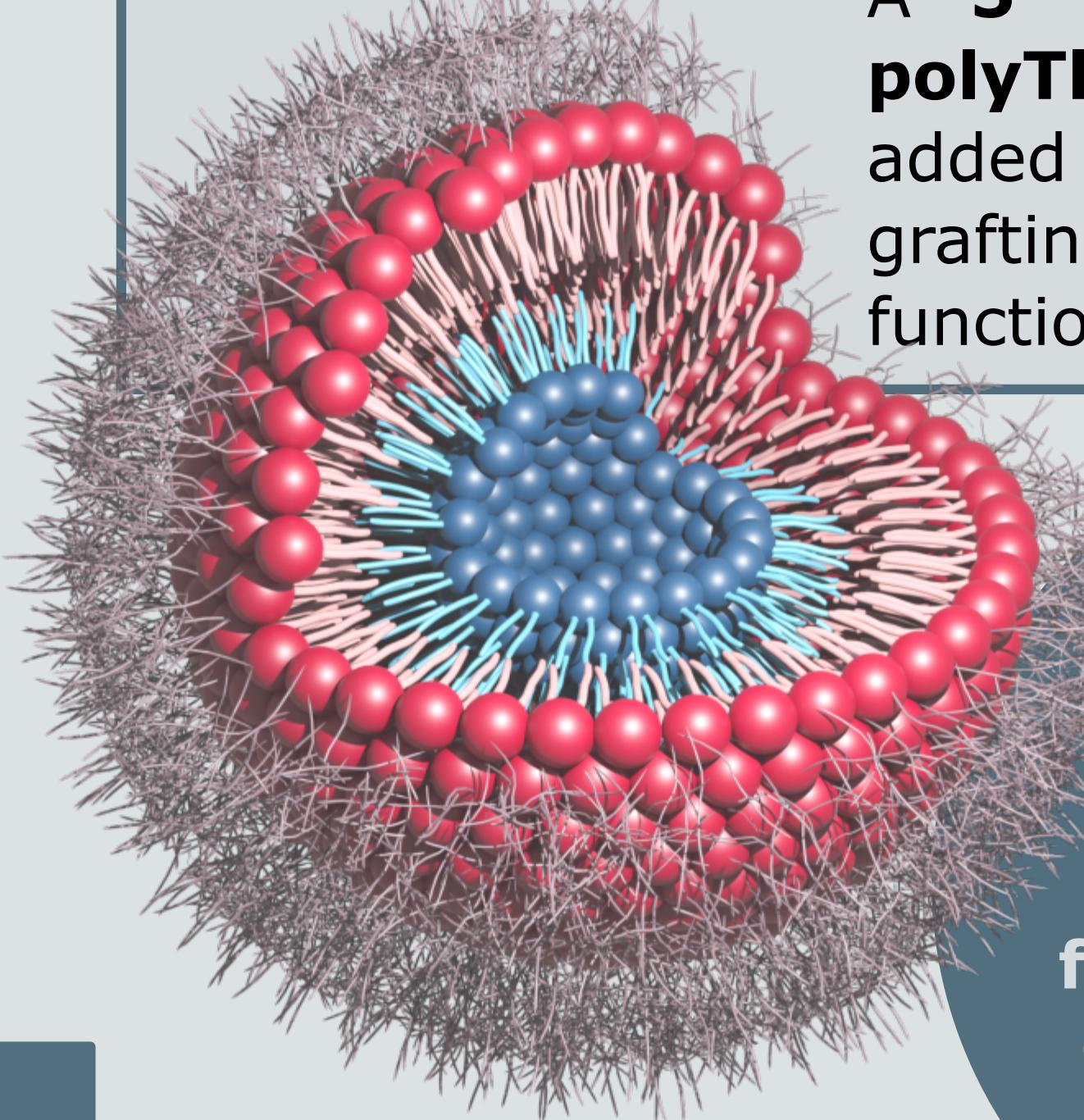
Variations of this thin angle correspond to changes on the biochip surface.

Design of aptamers:



Aptamers from literature^(1,2) were truncated according to their 2D structure and their melting temperature and stability using mFold software.

A 5' amine modification and a polyThymidine (pT6) spacer were added to respectively allow aptamer grafting and structuration on gold functionalized surface.



Nanosomes:

To increase the sensitivity, bacteria membranes are fragmented in vesicles of about 200 nm which are called nanosomes.

RESULTS

