

# Colorimetric cellulose-based test strip for the rapid assessment of pathogens exposure

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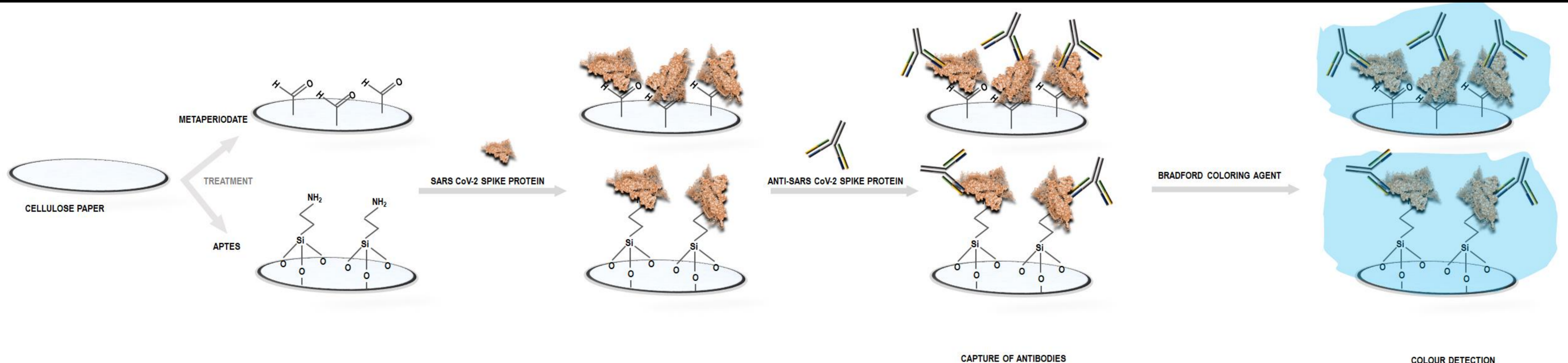
## Introduction

Antibody testing plays a crucial role in identifying individuals previously infected with a specific pathogen. The role of antibody testing gained extreme importance, especially during the COVID-19 pandemic, as monitoring anti-SARS-CoV-2 antibodies provides vital epidemiological and clinical insights into the evolution of coronavirus disease and the stratification of immunized and asymptomatic populations. Therefore, access to a highly portable and user-friendly sensor for point-of-care detection of SARS-CoV-2 antibodies or others contributes to aid in the timely diagnosis of infections or immune responses, immunity monitoring to enable personalized treatments.

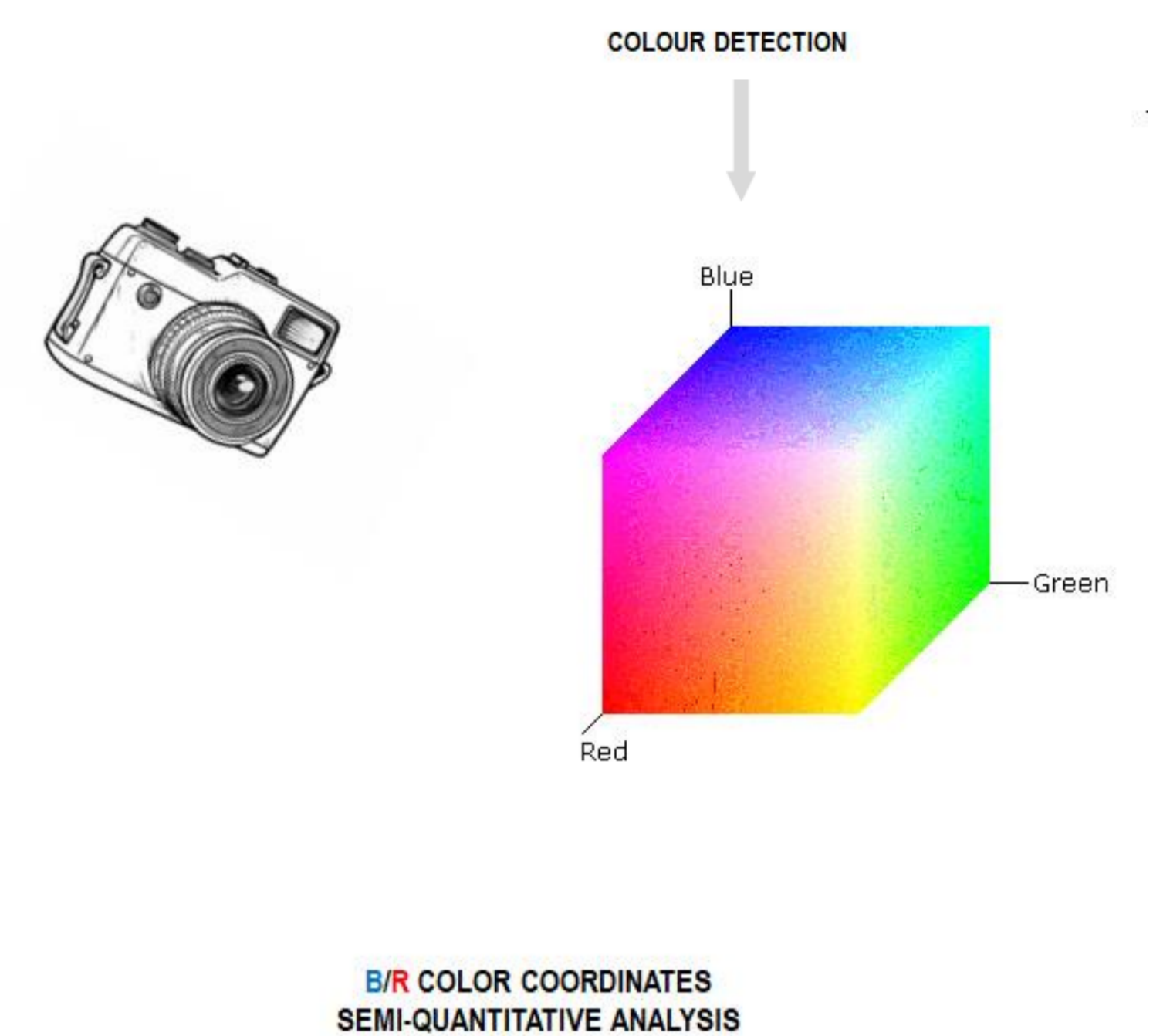
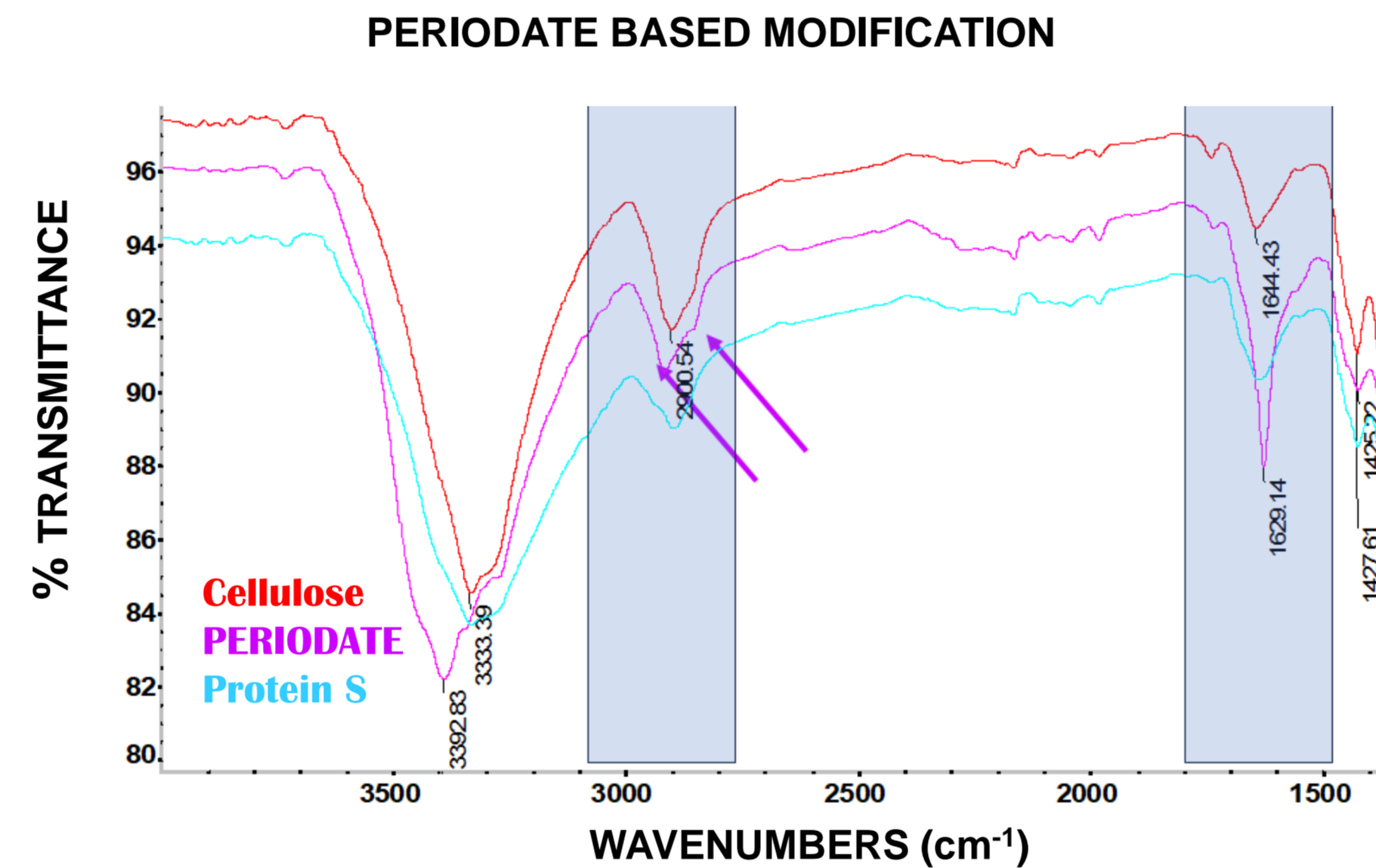
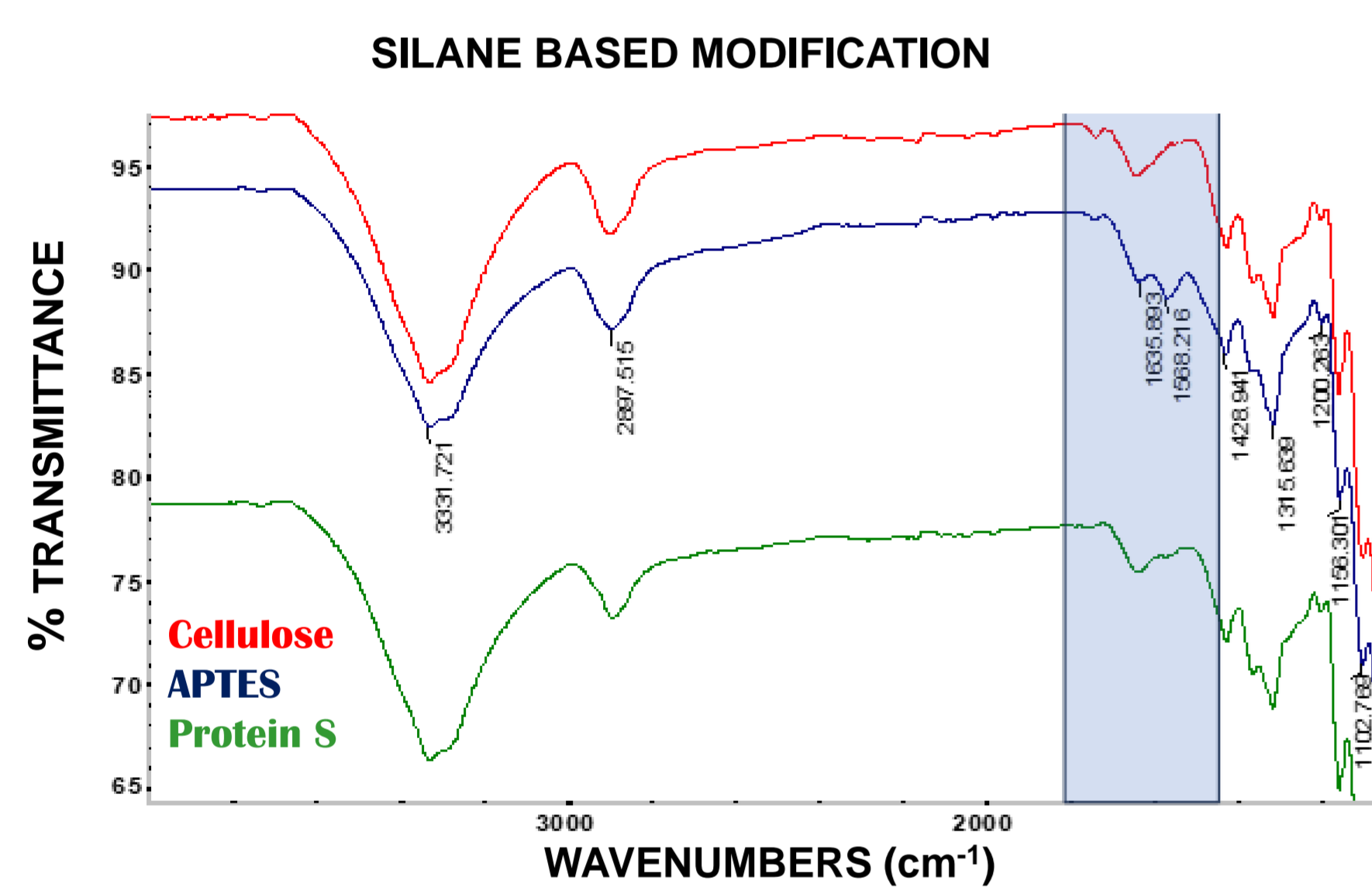
## Purpose

Our goal was to develop a paper-based test for semi-quantitative analysis through a colour scale analysed by naked eye and the smartphone-based quantification of the colour coordinates. Various cellulose-based substrates, as well as two chemical treatments, were explored for the covalent immobilization of the spike protein, also called protein S, which is a surface protein of the SARS-CoV-2 virus. The spike protein acted as the recognition element to capture the SARS-CoV-2 antibodies.

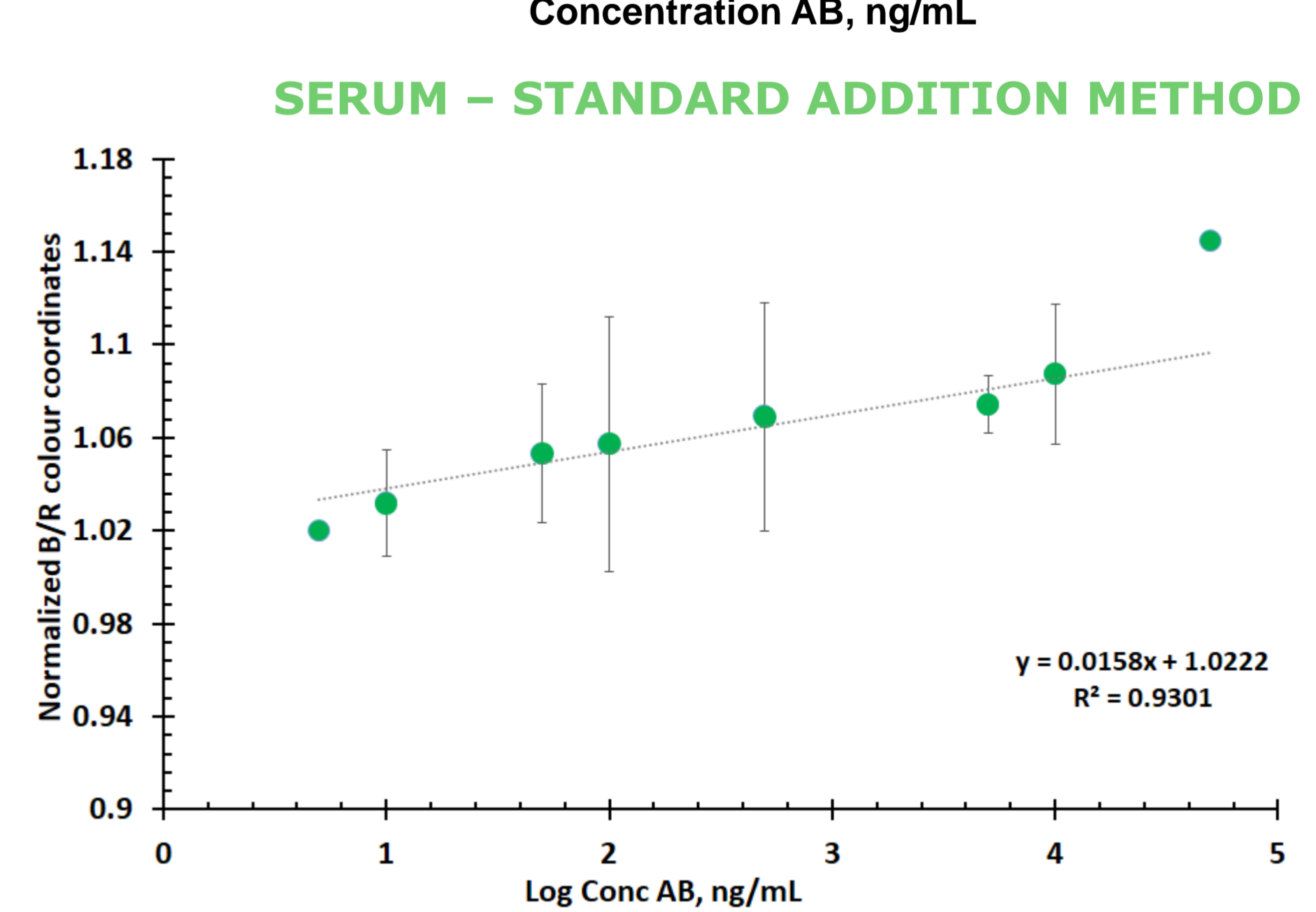
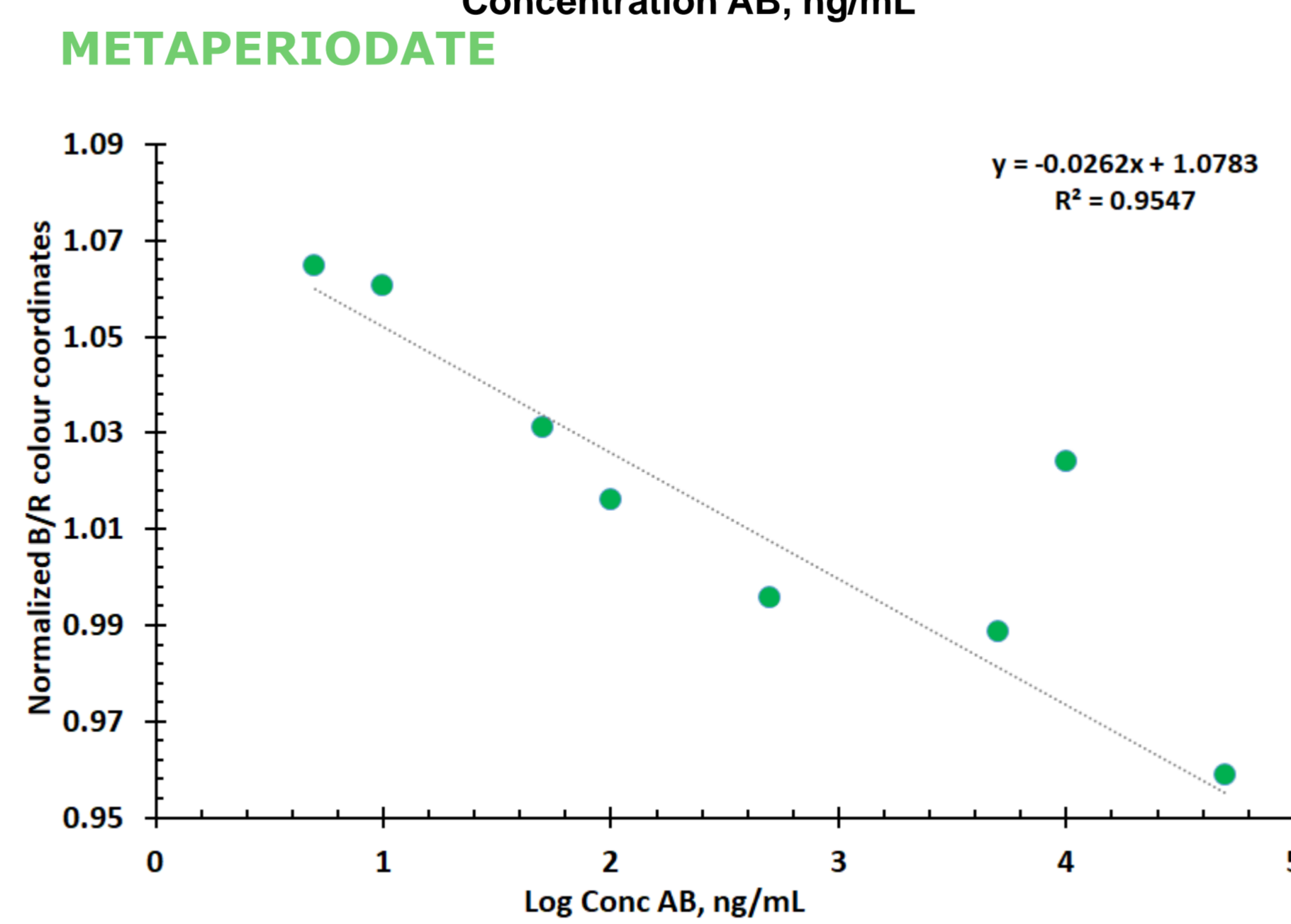
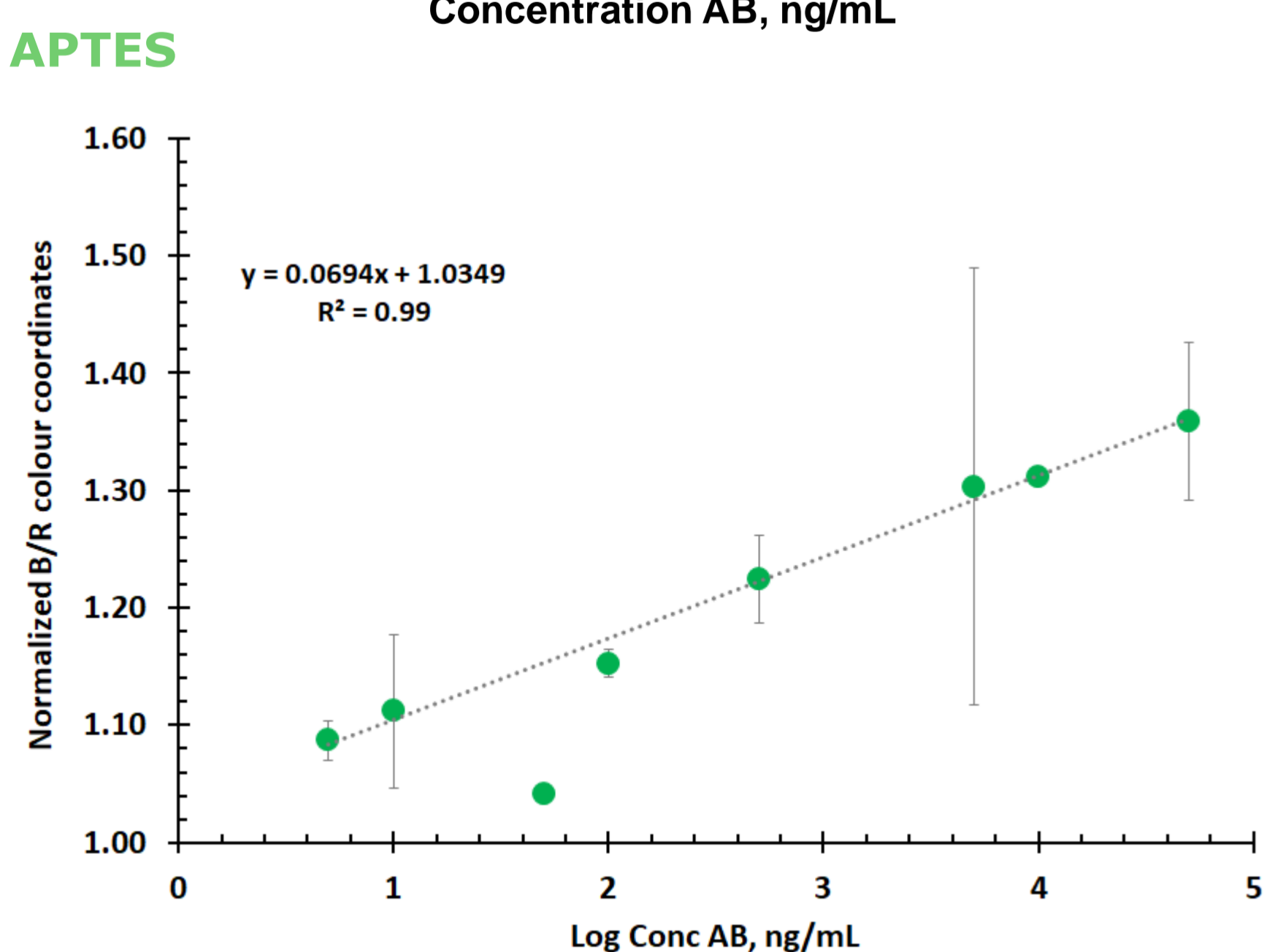
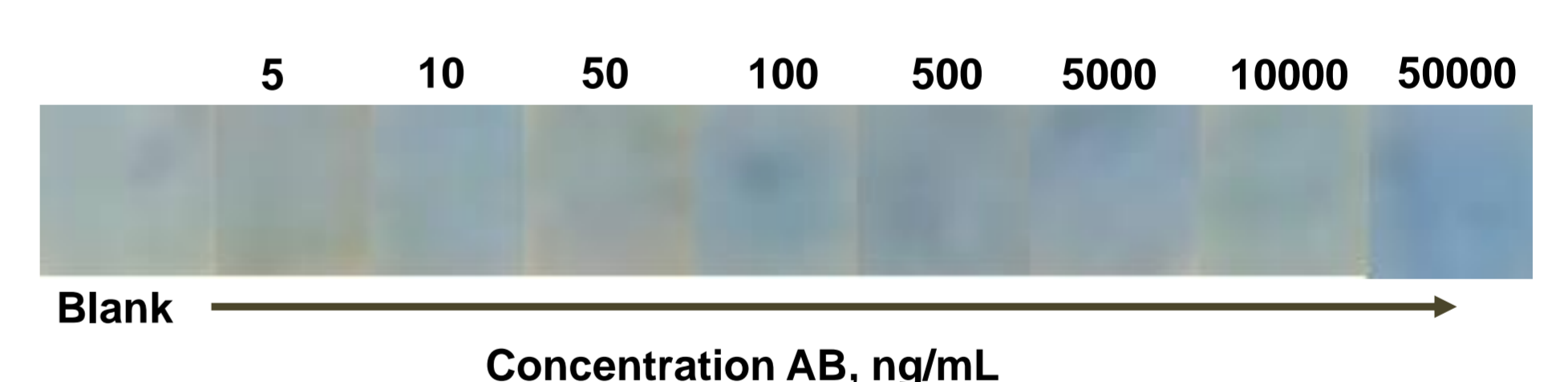
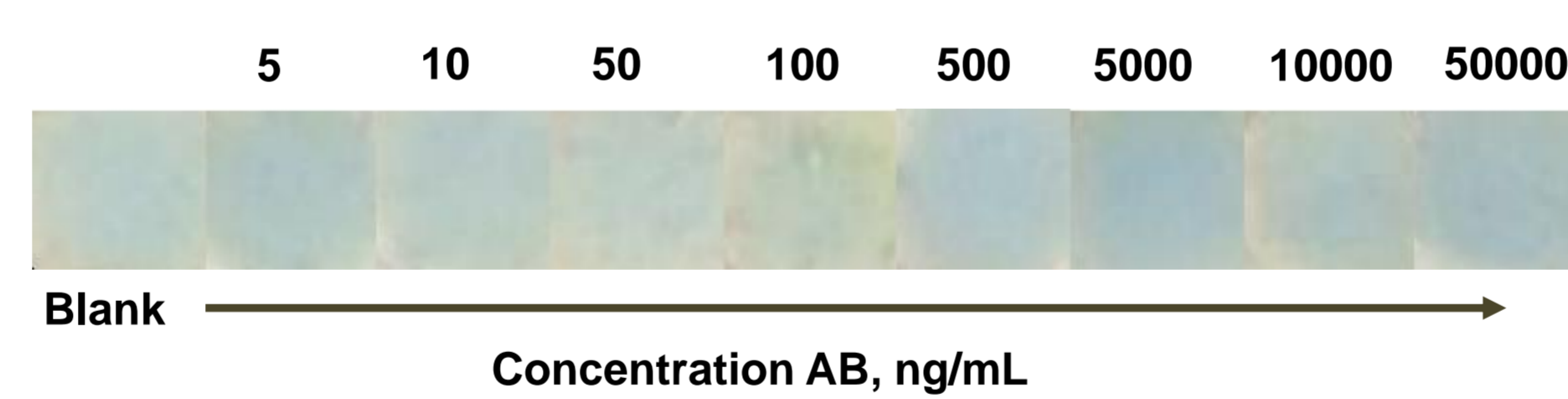
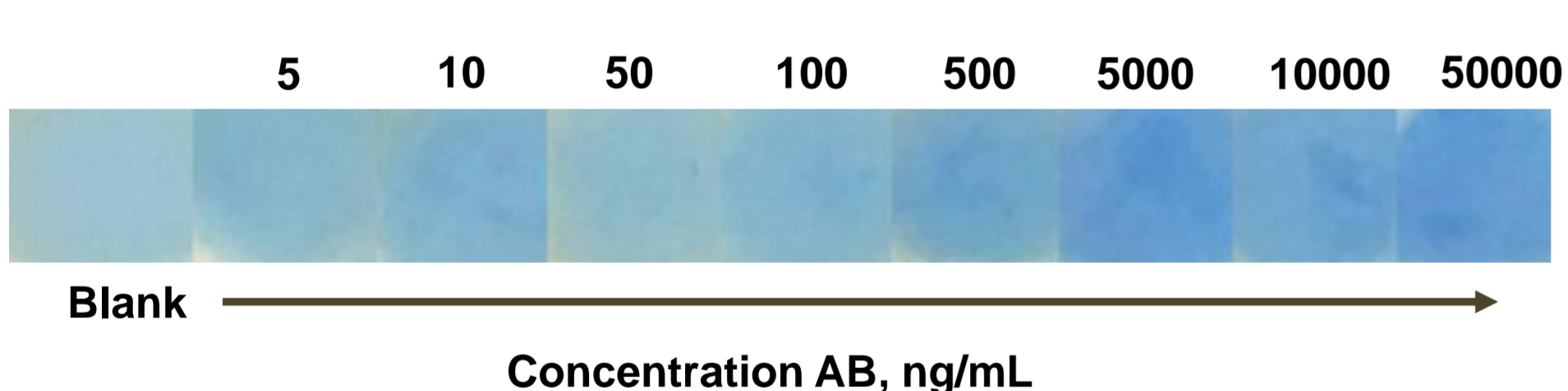
## METHODOLOGY



## SURFACE CHARACTERIZATION BY FTIR



## SENSING PERFORMANCE



## CONCLUSIONS

- Surface modification was confirmed by FTIR, with peaks at ~1629 cm<sup>-1</sup> attributed to carbonyl groups (METAPERIODATE) and peaks at 3300 cm<sup>-1</sup> and 1568.2 cm<sup>-1</sup>, indicating the presence the N-H bonds (APTES)
- Cellulose modified with silane APTES displayed higher signal-to-noise ratio and was the selected strategy
- ANTI-SARS CoV-2 Spike Protein (AB) quantification based on the colour coordinates (B/R) allowed to detect concentrations ranging from 5 to 5×10<sup>4</sup> ng/mL
- Serum with ANTI-SARS CoV-2 Spike Protein was successfully analysed by the standard addition method, with a Protein S concentration of 5 ng/mL

## AKNOWLEDGMENTS

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