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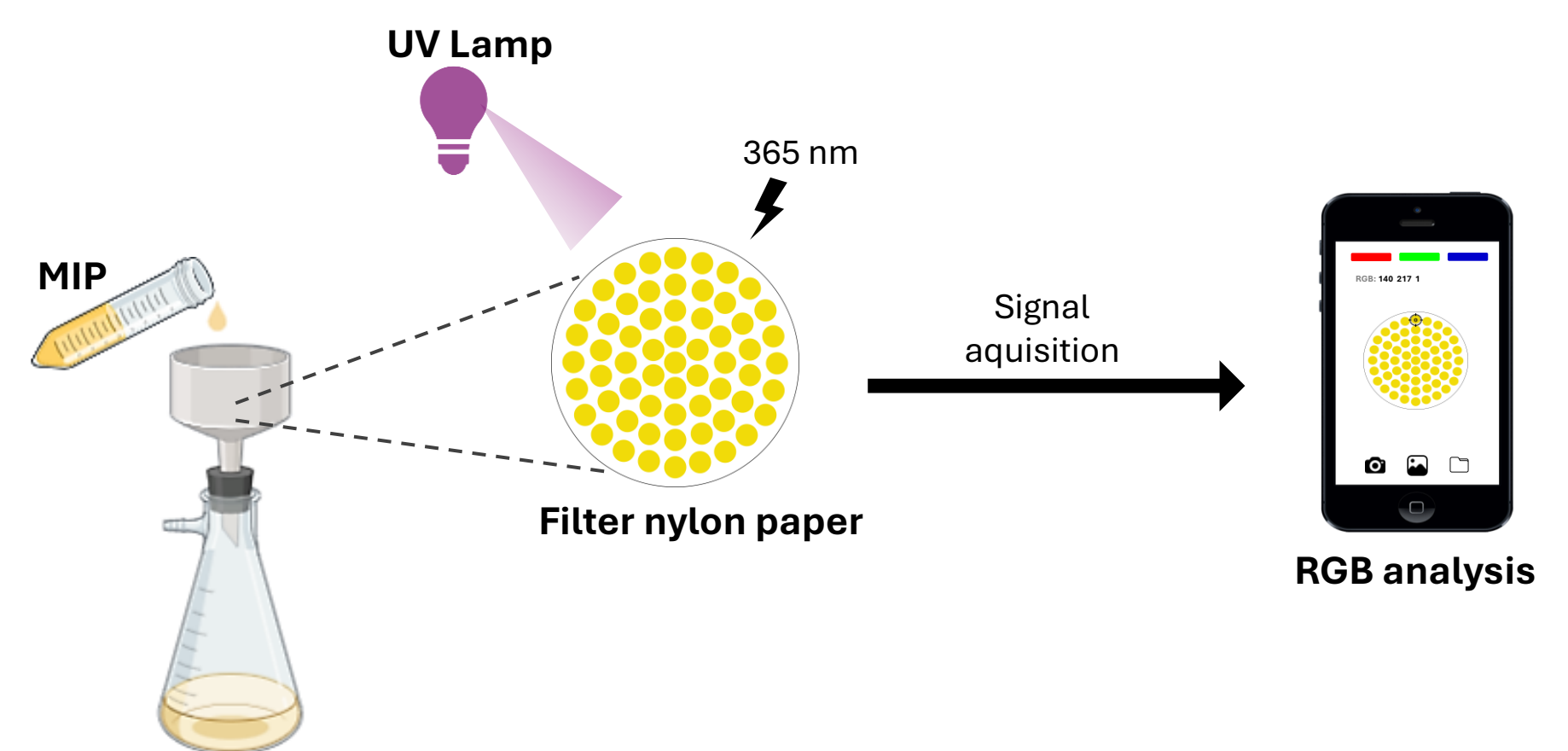
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## INTRODUCTION

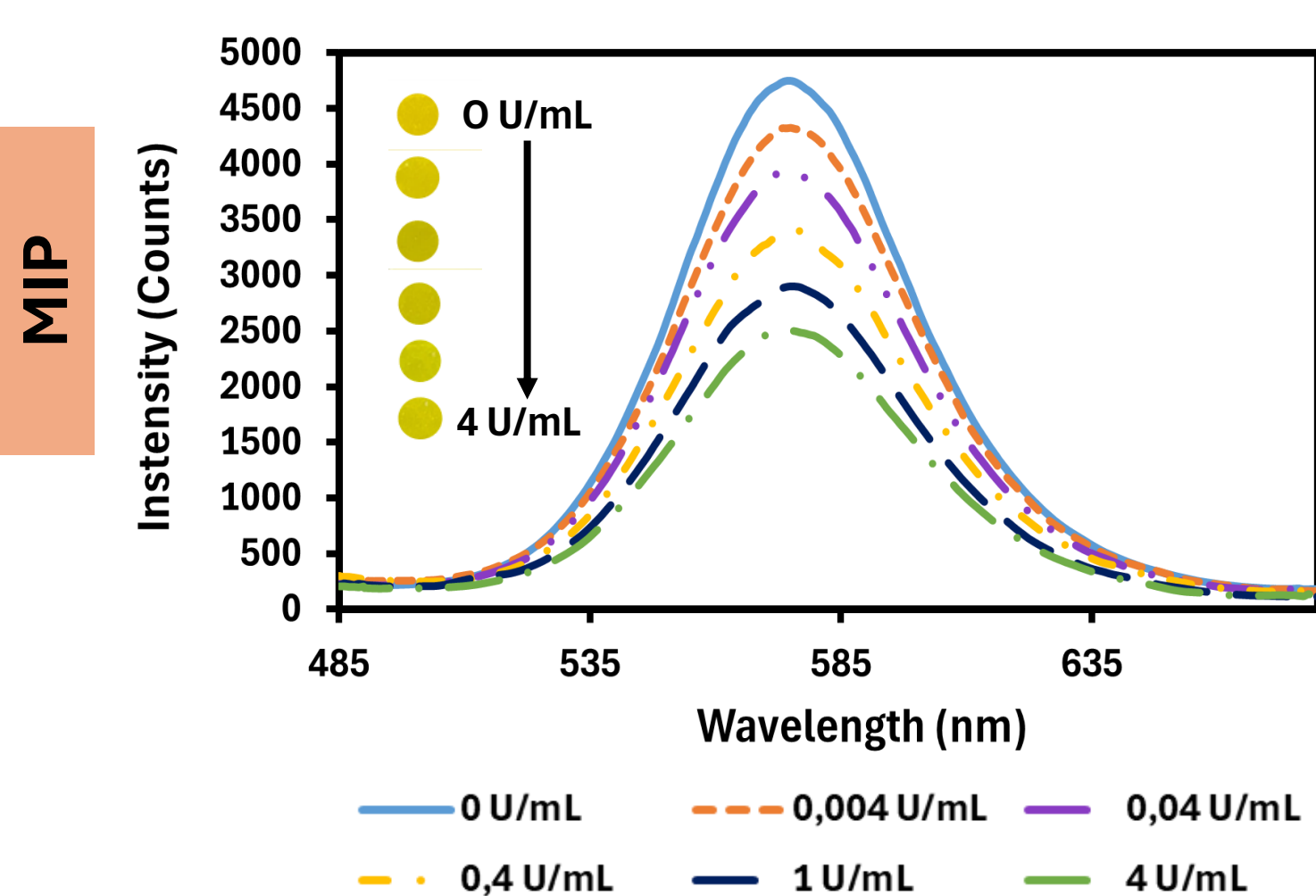
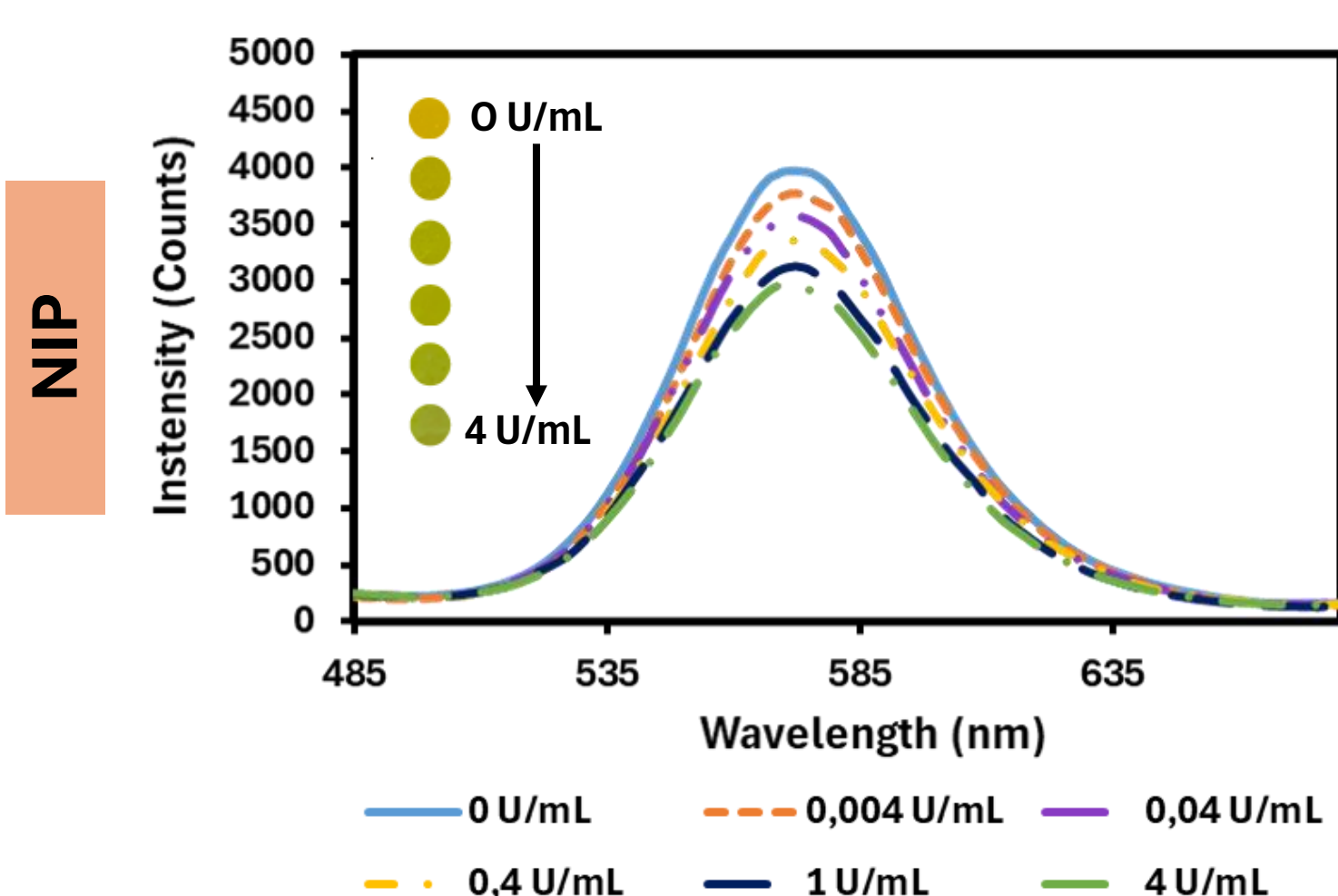
- The Carbohydrate antigen19-9 (CA19-9) is a biomarker widely used for the diagnosis and monitoring of various types of cancer, especially pancreatic cancer (PC) <sup>1</sup>.
- Molecularly Imprinted Polymers (MIPs) are synthetic materials with recognition sites molecularly designed to bind selectively to a target analyte, providing high specificity and sensitivity <sup>2</sup>.
- In this work, the use of solid supports such as membranes, was used to imprint the MIPs, allowing the creation of robust and easy-to-manipulate biomimetic sensors for the precise and efficient detection of biomarkers, specifically CA19-9.

## METHODOLOGY



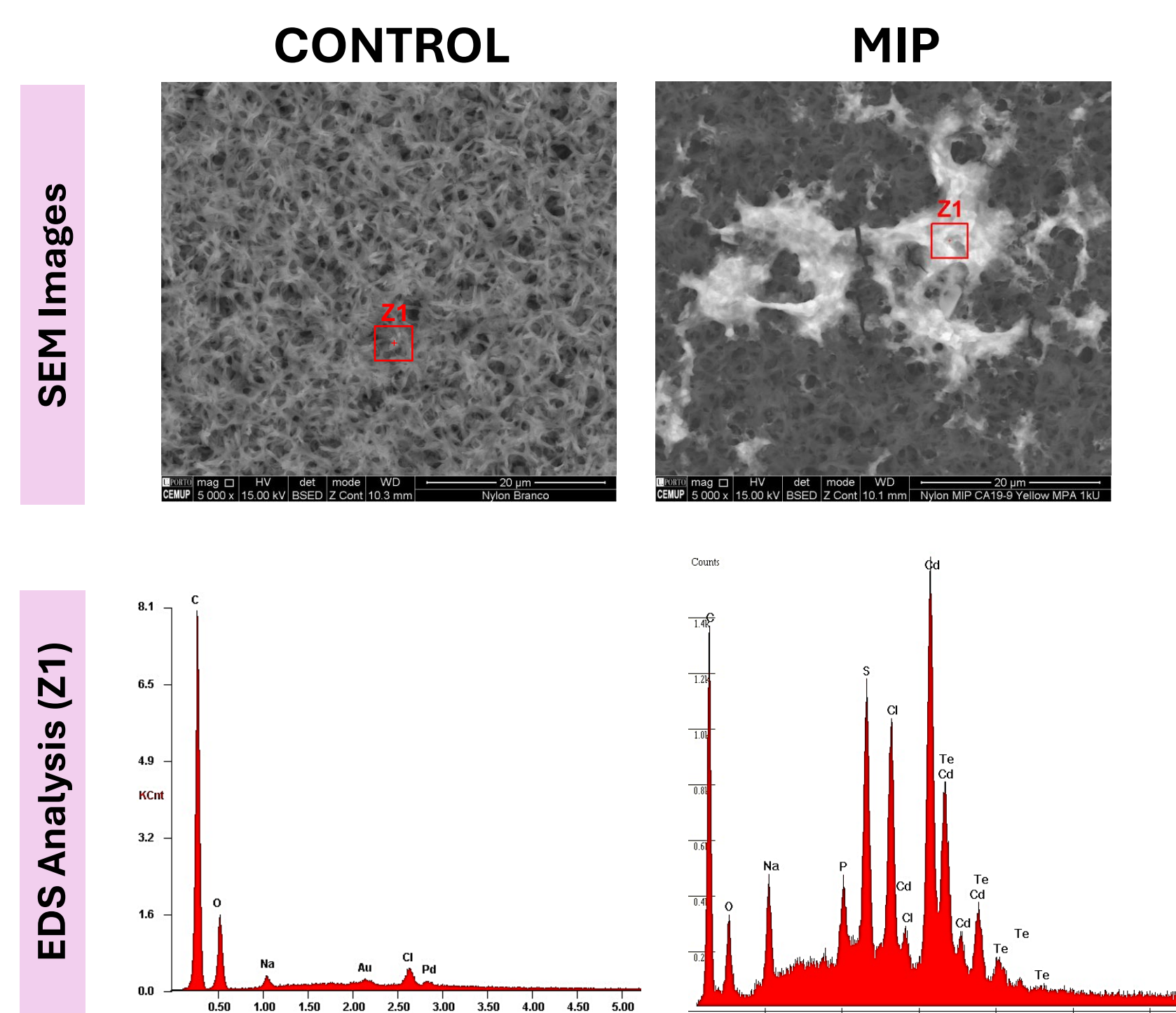
## RESULTS

### Biomimetic Sensor Response in Solution

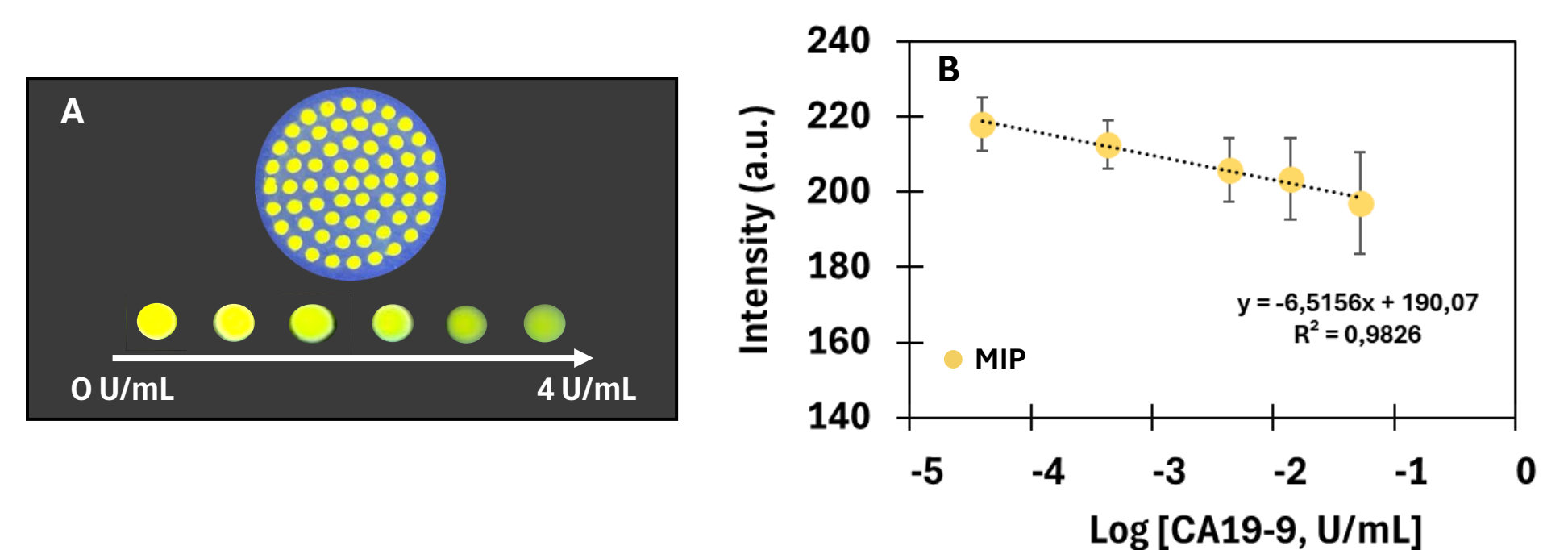


- ✓ Higher sensitivity
- ✓ Response over the concentration range of 0.04 to 4 U/mL with CA19-9 standards in 100 fold diluted human serum

### SEM Characterization of the Biomimetic Sensor



### Biomimetic Sensor Response in Solid Support



(A) Solid membrane assembled with MIPs conjugated to yellow-emitting fluorescent quantum dots (MIP@QDs) with different concentrations of CA19-9 standards in diluted human serum; (B) Linear relationship between the average RGB values of the MIP@QDs membranes as a function of different concentrations of CA19-9 diluted in human serum.

## GENERAL CONSIDERATIONS

- The developed biomimetic sensor presented a surface response below the cut-off level of 37 U/mL for PC diagnosis.
- The solid substrate provides evidence of the applicability of imprinted membranes as a sensitive portable optical sensor for CA19-9 quantification up to clinically significant levels.

## ACKNOWLEDGMENTS

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## REFERENCES

- G. Luo, K. Jin, S. Deng, H. Cheng, Z. Fan, Y. Gong, Y. Qian, Q. Huang, Q. Ni, C. Liu and X. Yu, *Biochimica et Biophysica Acta (BBA) - Reviews on Cancer*, 2021, **1875**, 188409.
- G. Selvolini and G. Marrazza, *Sensors*, 2017, **17**, 718.