

Ratiometric determination of CA19-9 using fluorescent carbon dots and yellow-emitting quantum dots

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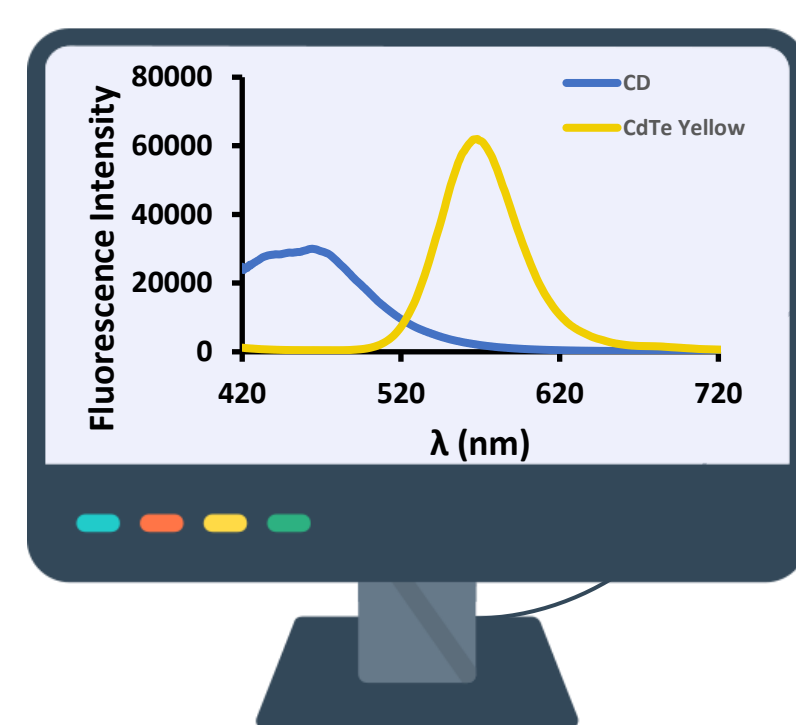
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INTRODUCTION

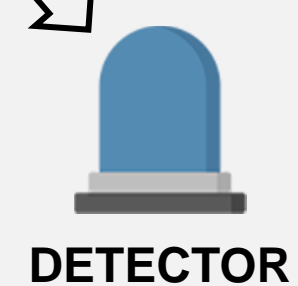
- Quantum dots (QDs) have high fluorescence, chemical stability and sensitivity and optical properties^{1,2}.
- Traditional QDs probes have a single peak, leading to some problems such as systemic errors due to detection conditions and fluorescence background¹ and systemic instability².
- Ratiometric methods eliminate random changes in QDs fluorescence intensity and reduces optical fluctuations not caused by the target^{2,3}.

MATERIAL AND METHODS

In this study, we assemble molecularly imprinted polymers (MIPs) around yellow-emitting QDs to detect carbohydrate antigen 19-9 (CA19-9) cut-off value 37 U/mL⁴ in conjunction with a second probe, carbon dots (CDs). The CDs have an inert reactivity, low toxicity, and biocompatibility, which makes them a good internal control.



EXCITATION SOURCE

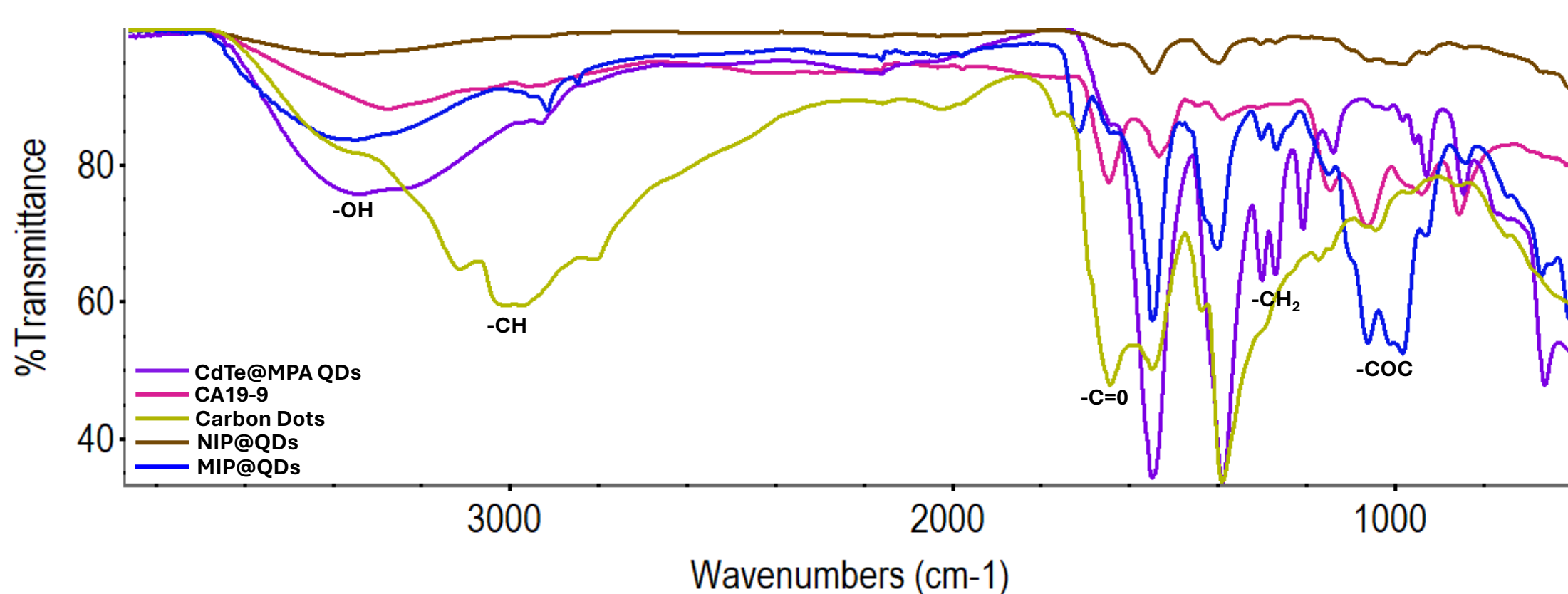


DETECTOR

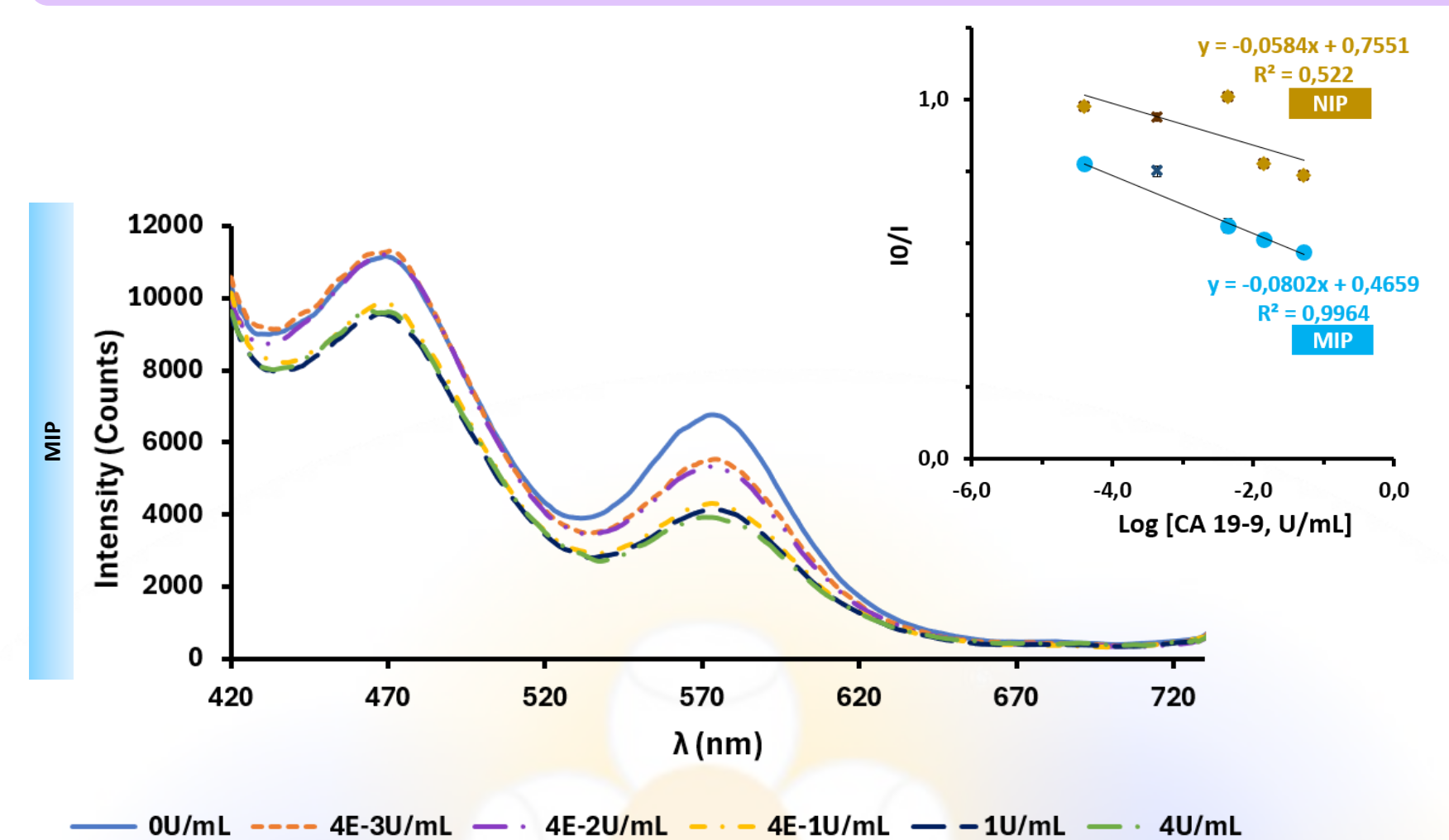
RESULTS

- CDs are susceptible to systemic errors, but they are not sensitive to the analyte.
- A higher level of linearity and sensitivity is obtained conjugating CDs with the MIP@QDs probes.

System Characterization by FTIR



Biomimetic Sensor Analytical Performance



GENERAL CONSIDERATIONS

- The ratiometric MIPs are effective biomimetic sensors for CA19-9.
- This method allows detection of CA19-9 in human serum without background and environment fluctuations.

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