

ROLE OF TYROSINE ON PHOTOPHYSICAL PROPERTIES OF CARBON DOTS

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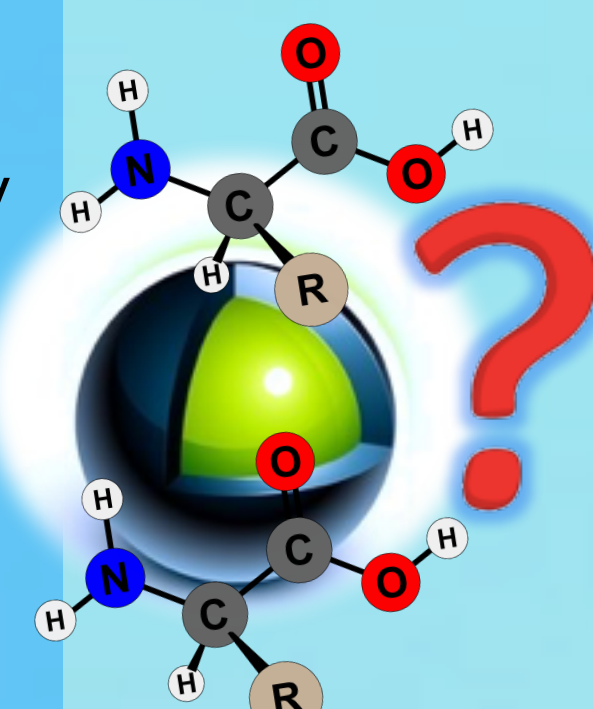
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ABSTRACT

Tyrosine (Tyr) is an important aromatic amino acid that is involved in maintaining a positive nitrogen balance in the human body. Currently, there are various methods to detect Tyr but they are not advantageous as using nanomaterials. One type of nanomaterials, carbon dots, exhibit low toxicity and desirable photophysical properties for biosensing applications. The photophysical properties of dual-fluorescing carbon dots were tested using UV-vis and fluorescence spectroscopy. The Tyr amino acid titrations were carried out and fluorescence was monitored. The fluorescence intensity was quenched depending on the amino acids used. In the 0.005-0.105 mM concentration range of Tyr and phosphotyrosine, no fluorescence quenching. However, quenching was observed with nitrotyrosine. Data indicate that water soluble carbon dots are ideal for biosensing application, and for mechanistic studies of their interactions with biomolecules towards functional materials.

INTRODUCTION

- Tyr can be directly correlated to many metabolic and mental disorders.¹
- It is important that there is balance of Tyr in the body as high levels of Tyr lead to Tyrosinemia disease and low levels lead to depression, albinism, and alkaptonuria.²
- Nanomaterials (less than 10 nm in size) have a wide range of applications in sensors, catalysis, environmental monitoring, and are valuable sensing materials.³



RESEARCH OBJECTIVES

- To explore photophysical properties of carbon dots (CDs) towards detection of amino acids, specifically, tyrosine and its analogues

CHARACTERIZATION OF CARBON DOTS

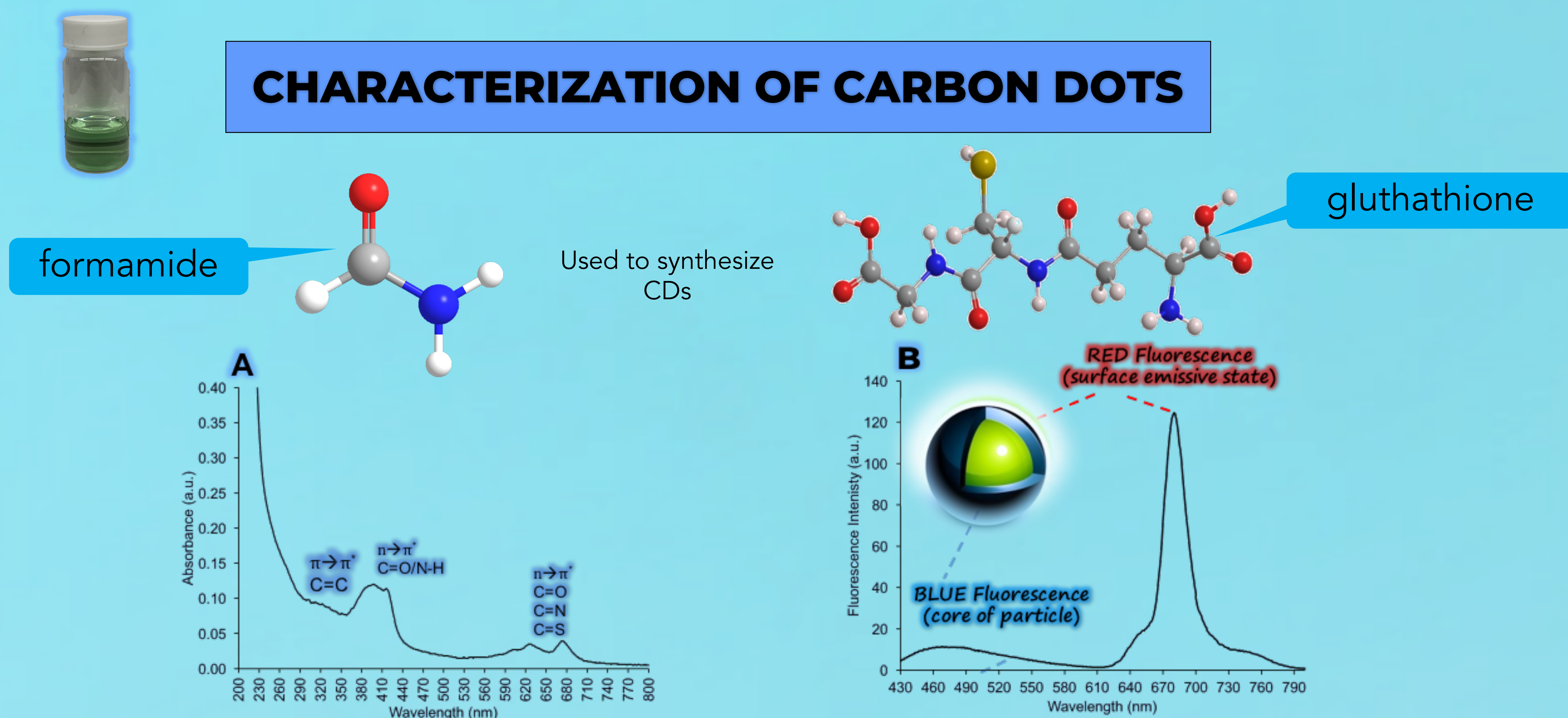


Figure 1. (A) UV-vis spectrum of CDs and (B) fluorescence emission spectrum ([CDs] = 0.033 mg/mL; in MES Buffer, pH 6.8; λ_{ex} = 420 nm).

DETECTION OF AMINO ACIDS USING CARBON DOTS

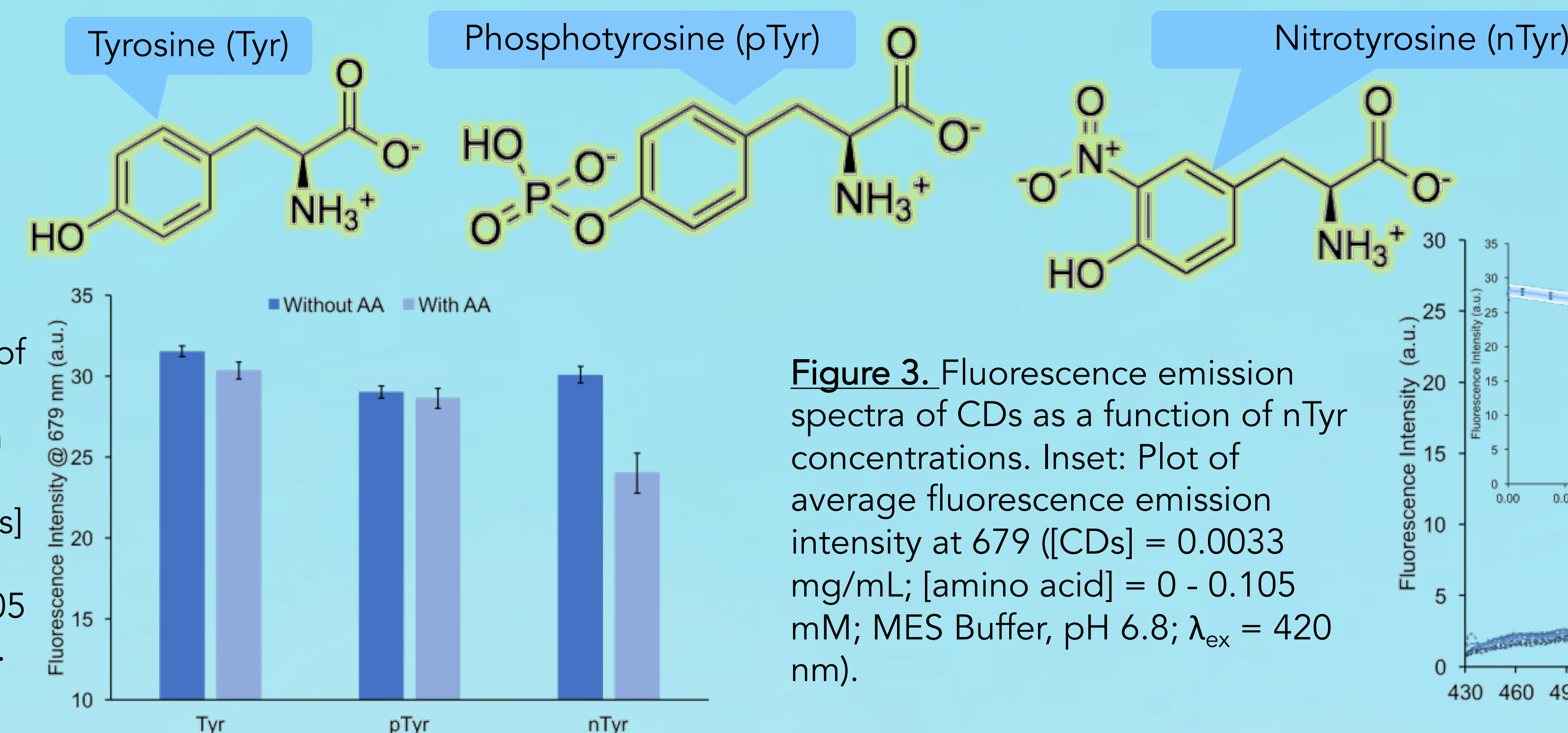
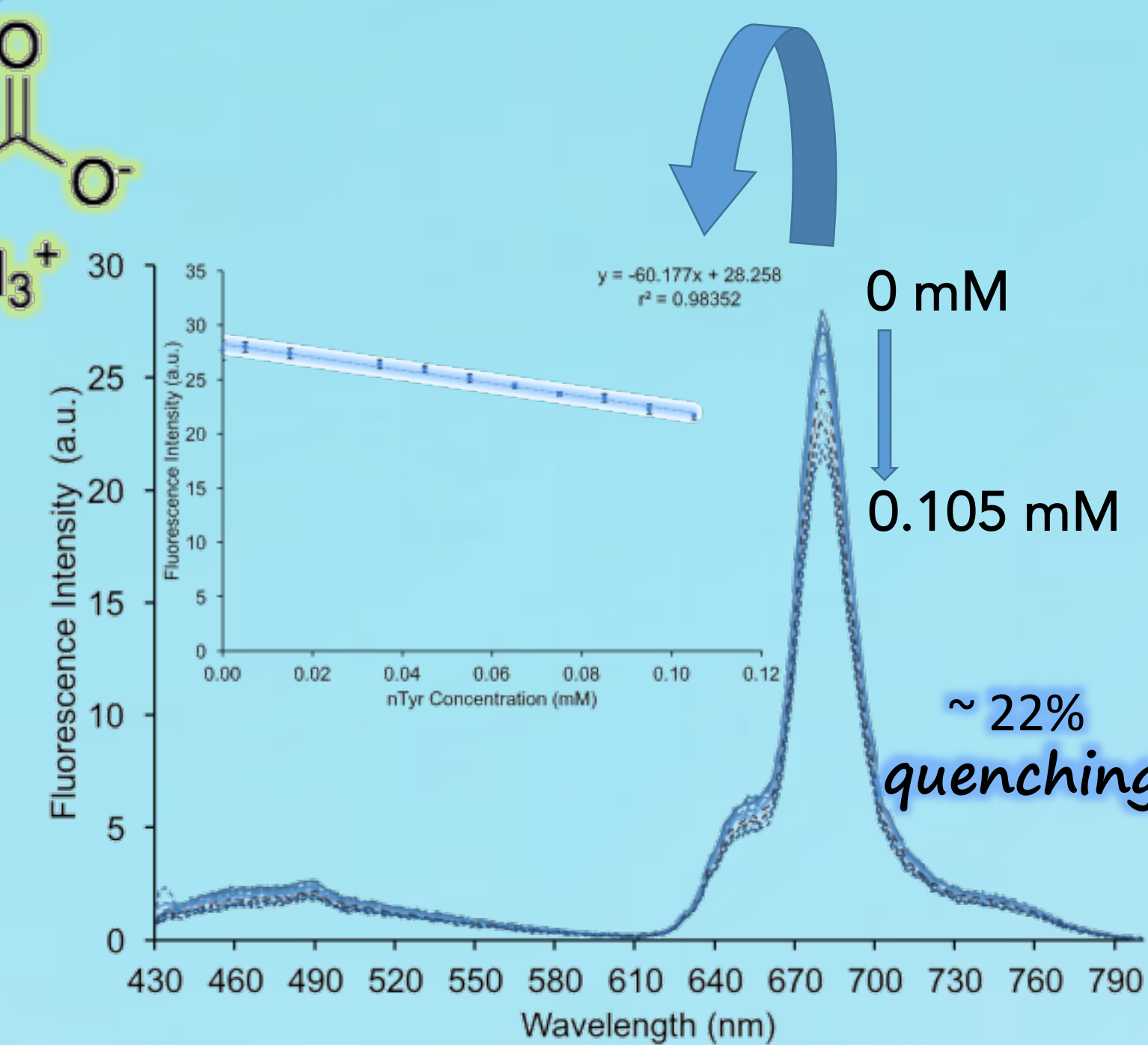


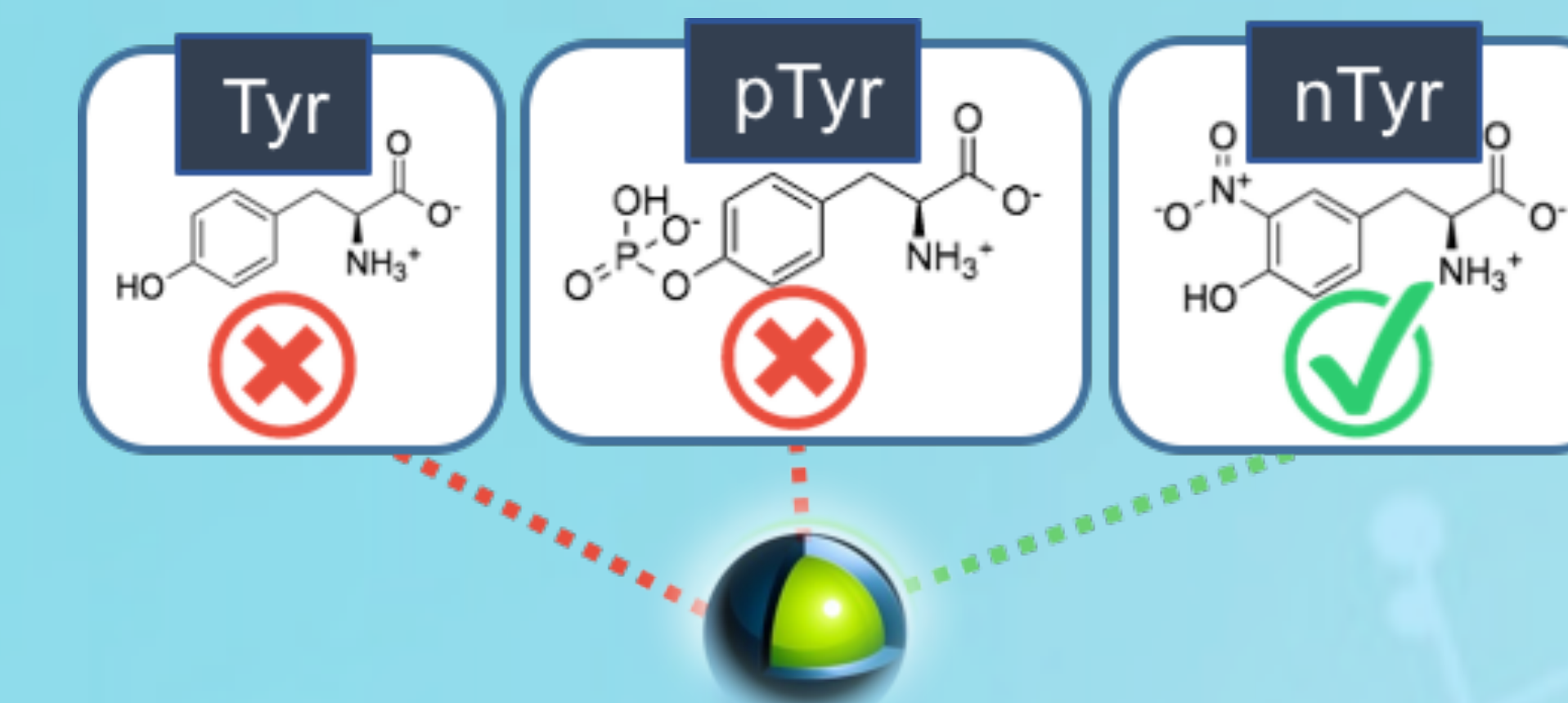
Figure 2. Average of peak fluorescence intensity at 679 nm of samples in MES Buffer, pH 6.8 ([CDs] = 0.0033 mg/mL; [amino acid] = 0.105 mM; λ_{ex} = 420 nm).

Figure 3. Fluorescence emission spectra of CDs as a function of nTyr concentrations. Inset: Plot of average fluorescence emission intensity at 679 ([CDs] = 0.0033 mg/mL; [amino acid] = 0 - 0.105 mM; MES Buffer, pH 6.8; λ_{ex} = 420 nm).



CONCLUSION

CDs are selective to nTyr but not Tyr and pTyr



FUTURE WORK & APPLICATION

- pH studies
- Biological matrices like saliva
- Application: point of care testing of nTyr in clinical setting
- A simple method of detecting diseases related to nTyr imbalance will allow for treatments to be administered faster, mitigating their effects on an individual's health and well being.



ACKNOWLEDGEMENTS

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