An Indandione Functionalized Tetraphenylethylene Fluorogen for the Detection of Arginine and Lysine

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INTRODUCTION

As two of the most alkaline common amino acids, both arginine (Arg) and lysine (Lys) play unique roles in a series of biological processes, and the sensing of these two special amino acids is of great fundamental and practical significance.[1,2] A few techniques, such as high-performance liquid chromatography and electrochemical analysis, have been concreted in practice and reported in literatures. Here, we present a concept-proof work of using a fluorescence probe to detection Arg and Lys over other amino acids based on an aggregation-induced emission (AIE) fluorogen.[3]

RESULTS AND DISCUSSION

1. Selectivity

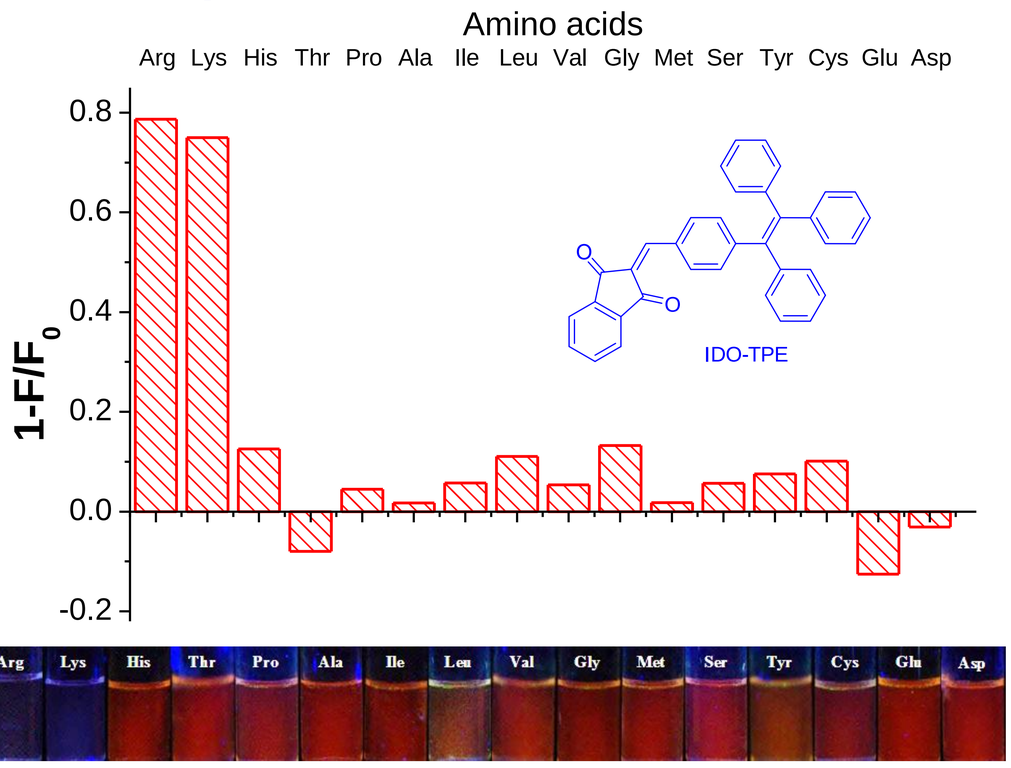


Figure 1. Specific response of IDO-TPE to diverse amino acids.

2. Time and Concentration Dependence

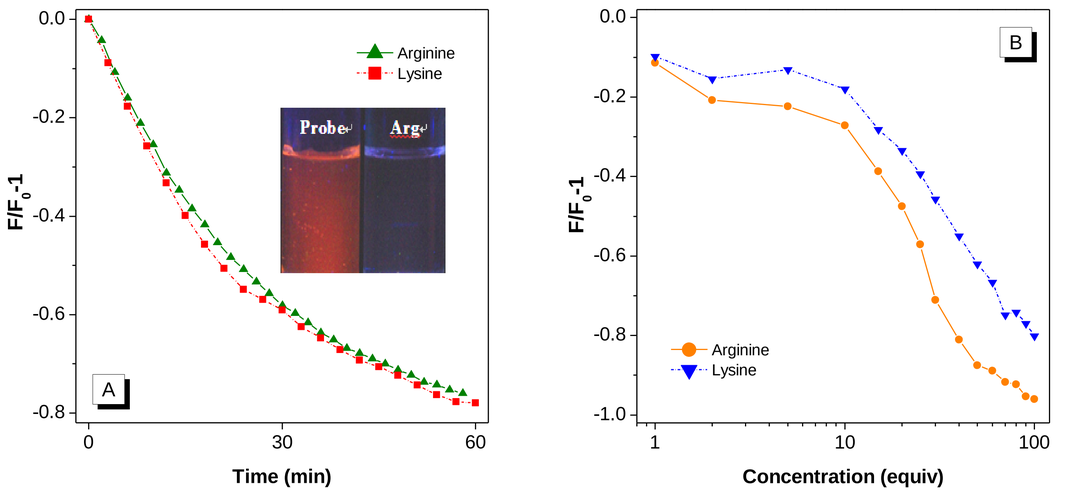
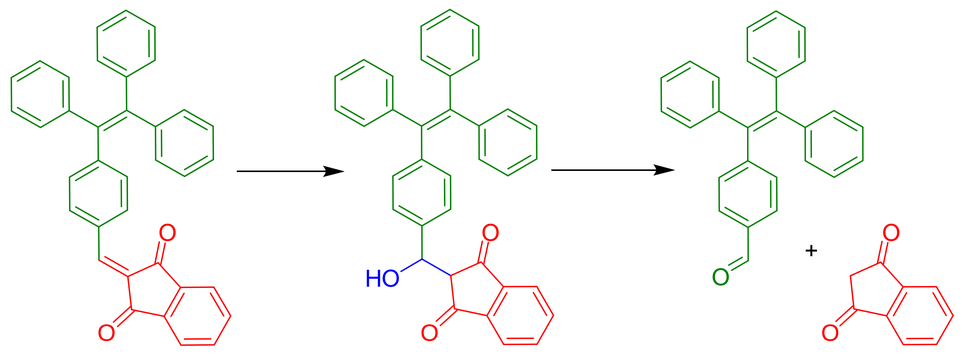


Figure 2. (A) Time dependent FL intensity of IDO-TPE + Arg and IDO-TPE + Lys; (B) FL intensity of IDO-TPE with different concentrations of Arg and Lys. Concentration of IDO-TPE: 10 μM; Excitation wavelength: 420 nm; in THF/water mixture.

3. Proposed Mechanism



Scheme 1. Proposed mechanism of the detection of Arg and Lys by IDO-TPE.

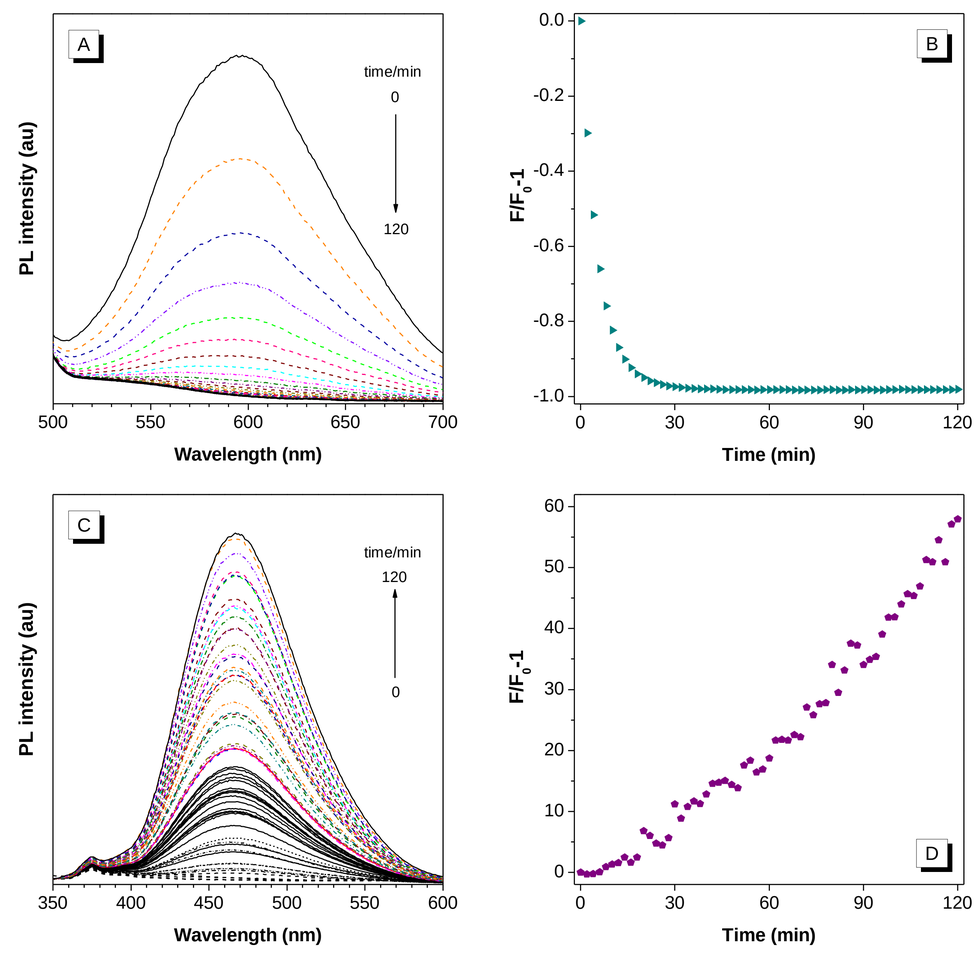


Figure 3. Time dependent FL spectra of IDO-TPE with an excitation wavelength at (A) 420 nm and (C) 330 nm in THF/buffer (pH 9.0); (B) and (D) corresponding plots of the changes in FL intensity for (A) and (C).

SUMMARY

A fluorescent probe of IDO-TPE has been used to detect Arg and Lys over other amino acids. With the addition of Arg or Lys into buffer solution of IDO-TPE, the orange emission band declines and a green band, assigned to the emission from TPE moiety, grows up. The change in emission color and intensity is explained by the reaction of IDO-TPE with OH^-, which destroys the conjugation between the indandione and the TPE moiety and recovers the fluorescence of the TPE moiety.

ACKNOWLEDGMENTS

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References

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