A Pyridine-bridged Bispyrrole Having *N*-Fluoroalkyl Imino Groups That Serves as Color and Spectroscopic Indicators of Perfluorocarboxylic Acids

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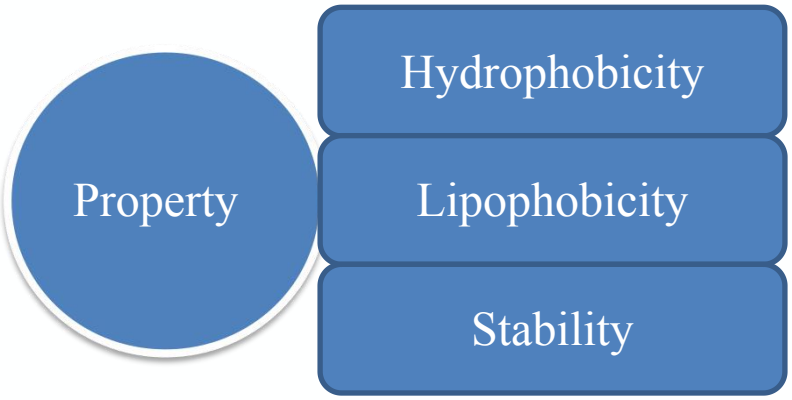
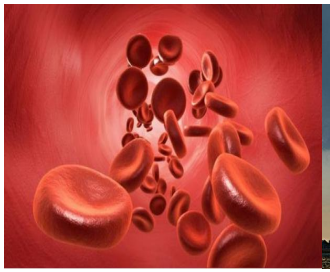
Applications of Perfluoroalkylcarboxylic Acids (PFCAs)



PFCAs Have Been Produced in Large Quantities in Industry Around the World.

Pollution

Source of Pollutants	c/ng·mL^{-1}
Shanghai Blood	18.44



Source of Pollutants	c/ng·mL^{-1}
Belgium Indoor Air	8.9×10^{6}

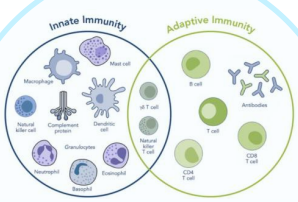
PFCAs

Source of Pollutants	c/ng·L^{-1}
Shanghai Surface Water	50.67

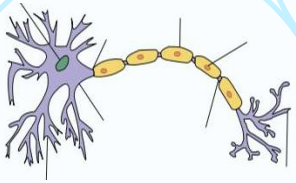
Source of Pollutants	c/ng·g^{-1}
Topsoil of the Pearl River Delta	2.19–98.5

M. H. Wu, et al. *Chemosphere.* **2017**, *168,* 100–105.
A. D. L. Torre, et al. *Sci. Total Environ.* **2019**, *685,* 308–314.
R. Sun, et al. *Ecotoxicol. Environ. Saf.* **2018**, *149,* 88–95.
B. L. Liu, et al. *Arch. Environ. Contam. Toxicol.* **2019**,*78,* 182–189.

Poisonous

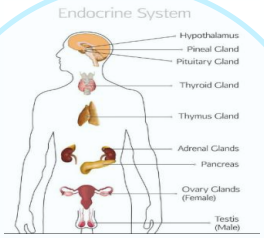


Immune System

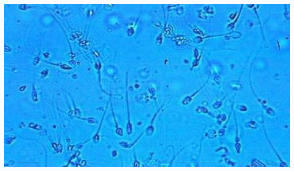


Nervous System

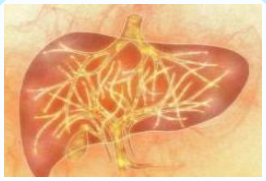
PFCAs



Endocrine System



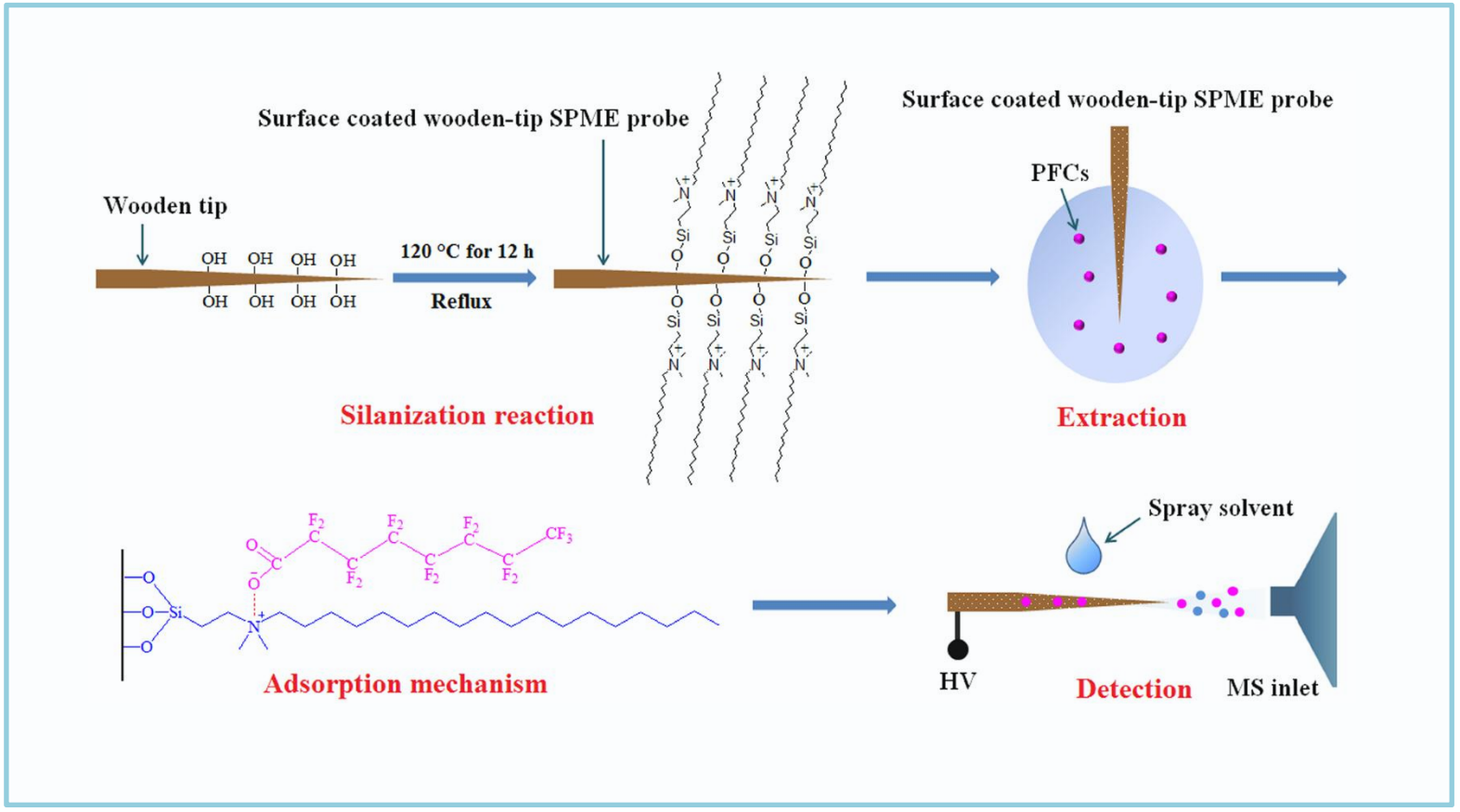
The Liver



Reproductive System

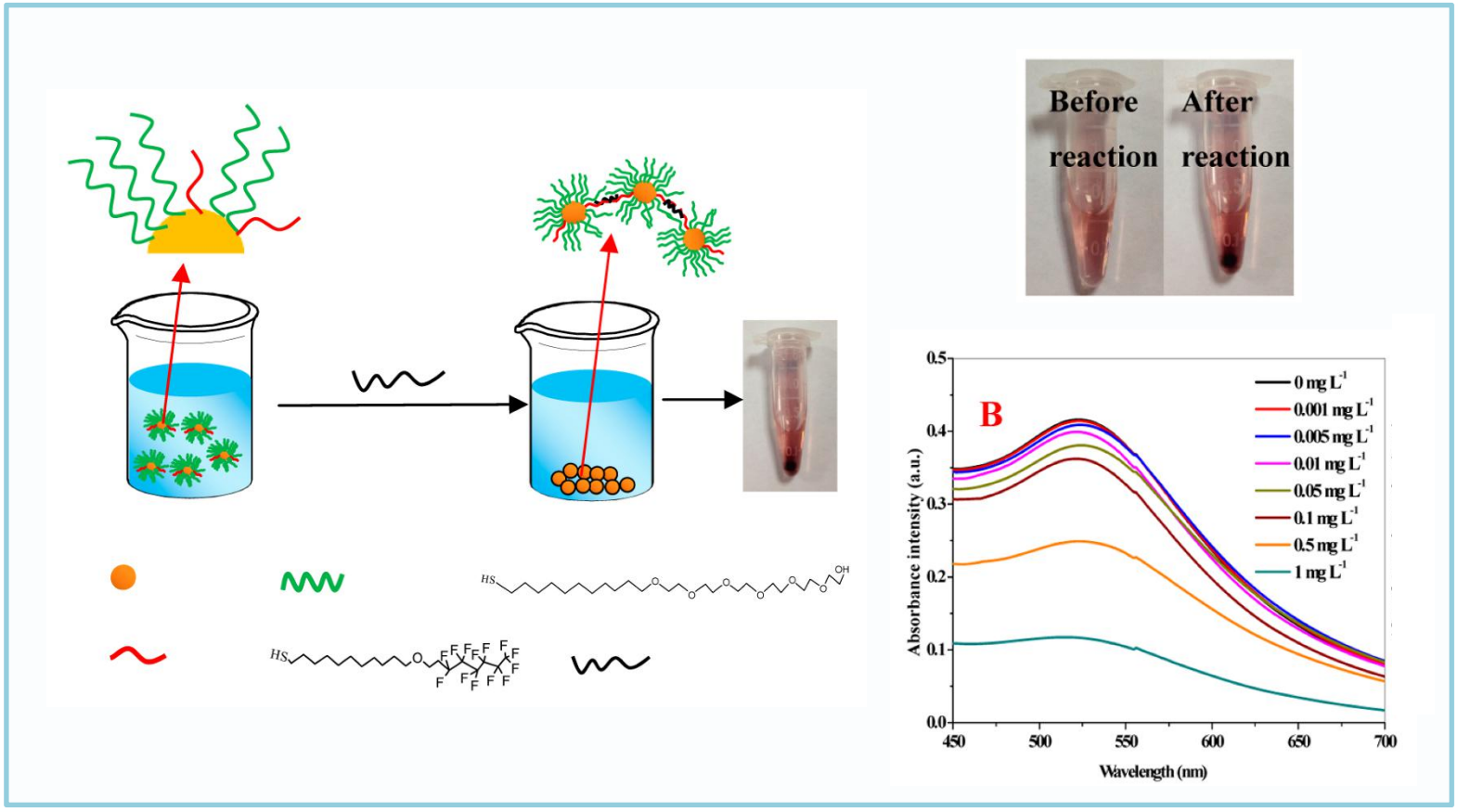
Q. Yang, et al. *Int. Immunopharmacol.* **2002**, *2,* 389–398.
R. G.Wei, et al. *Asian. J. Ecotoxicol.* **2012**,*7,* 483–490.
U. N. Joensen, et al. *Environ. Health Perspect.* **2009**, *117,* 923–927.
G. Z. Du, et al. *Nanjing Med. Univ.* **2013**, 1–4.
K. Harada, et al. *Biochem. Biophys. Res. Commun.* **2005**, *329,* 487–494.

Previous Studies on This Topic



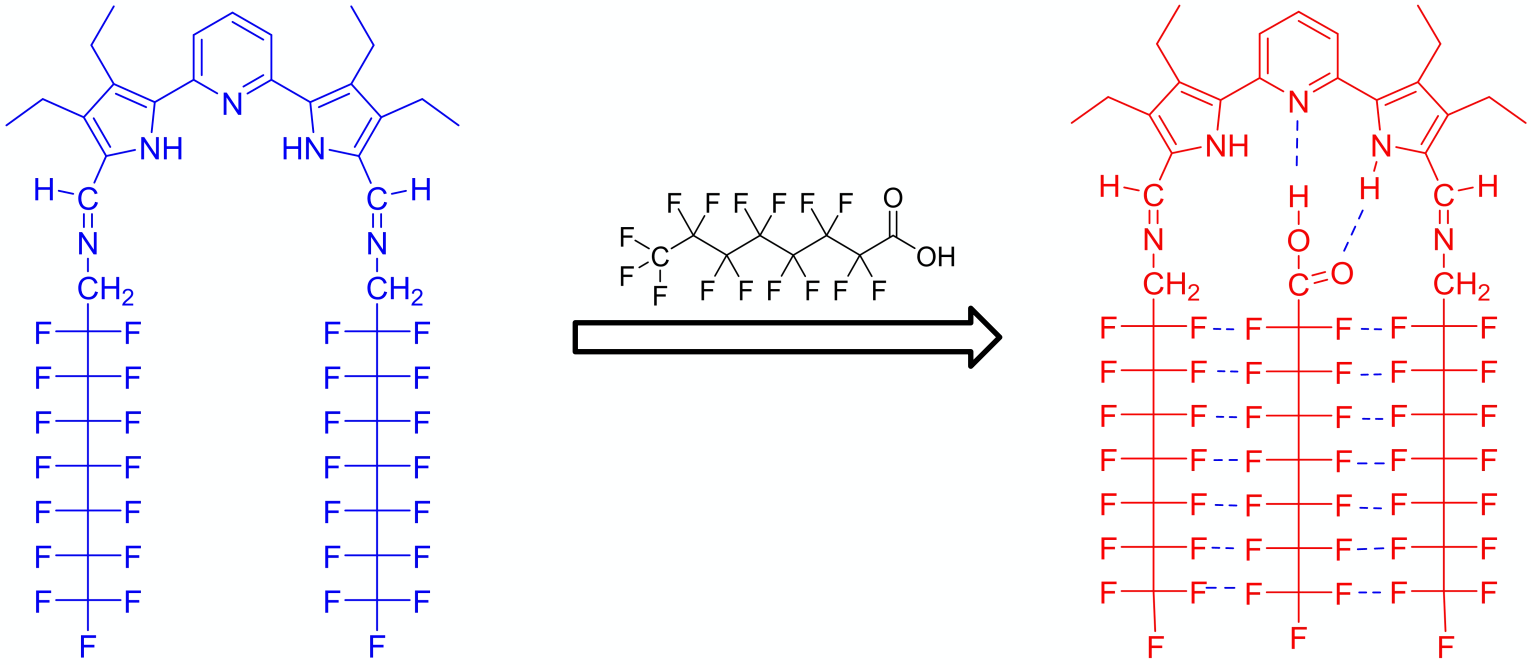
J. W. Deng, et al . *Anal. Chem,* **2014**, *86*, 11159–11166.

Previous Studies on This Topic



H. Niu, et al. *Anal. Chem,* **2014**, *86,* 4170–4177.

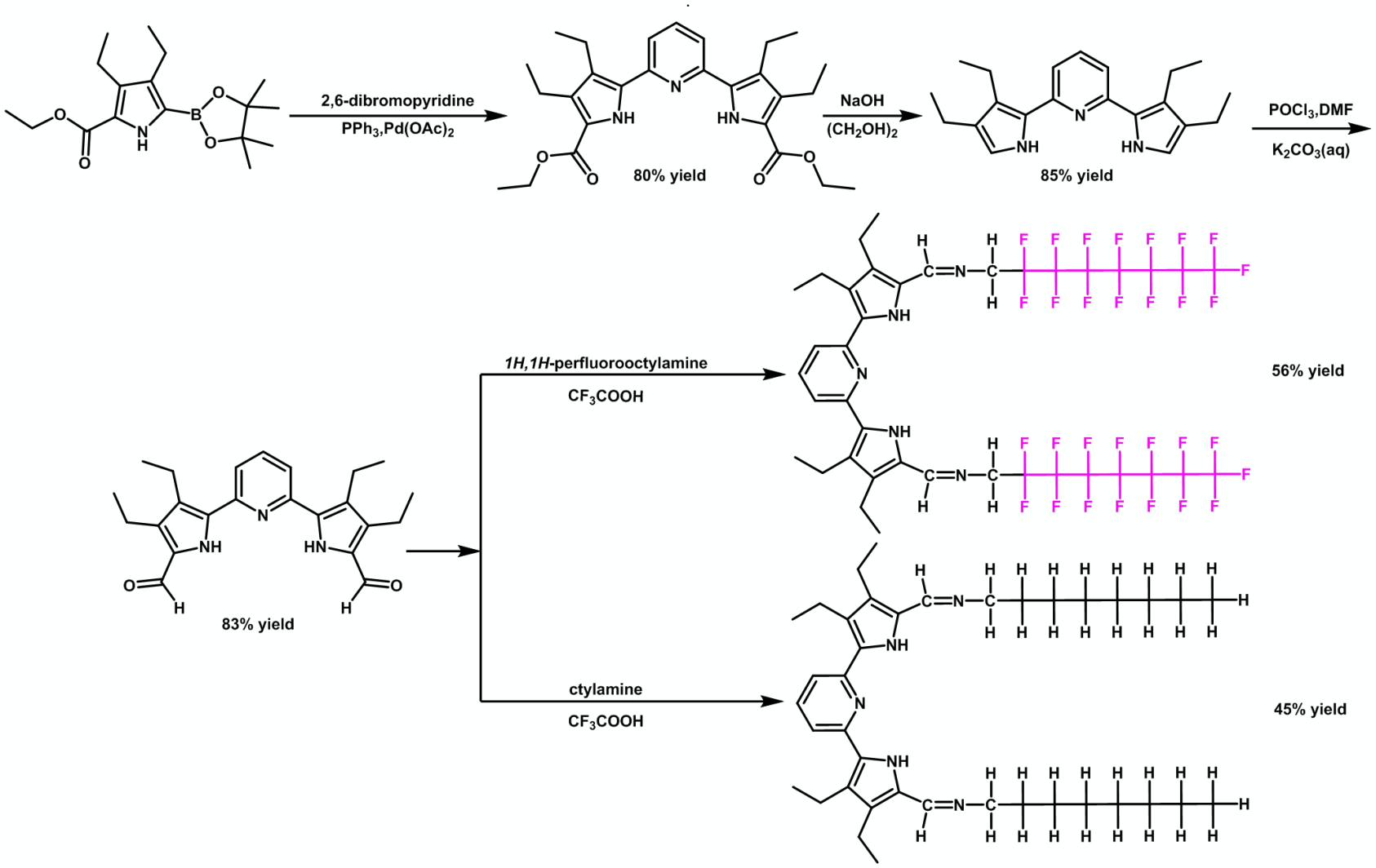
Objective of This Study



Design of the Molecule **Fluorescent Chemosensing**

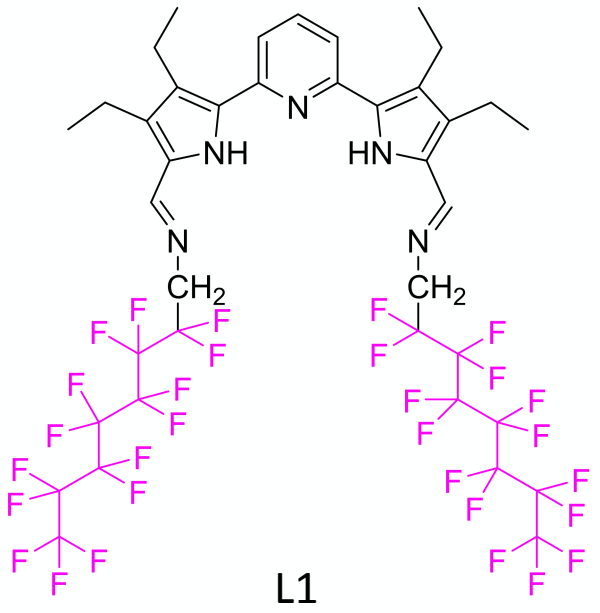
A Convenient Method to Detect PFCAs with High Sensitivity That Prevent Spreading the PFCAs to Environment.

Synthesis



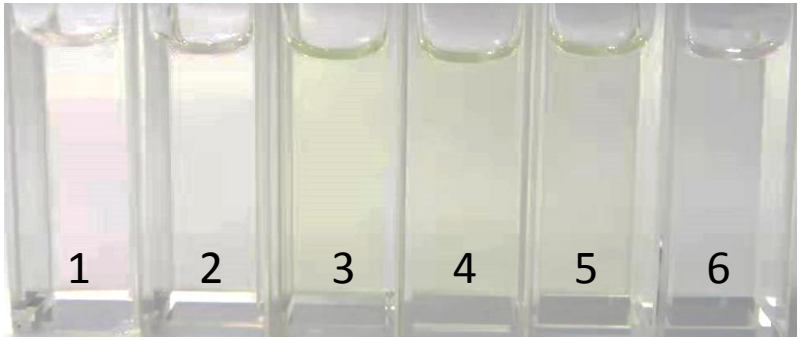
J.-i. Setsune, et al. *J. Am. Chem. Soc.* **2008**, *130,* 2404–2405.

Color Changes by Guest Recognitions



L1

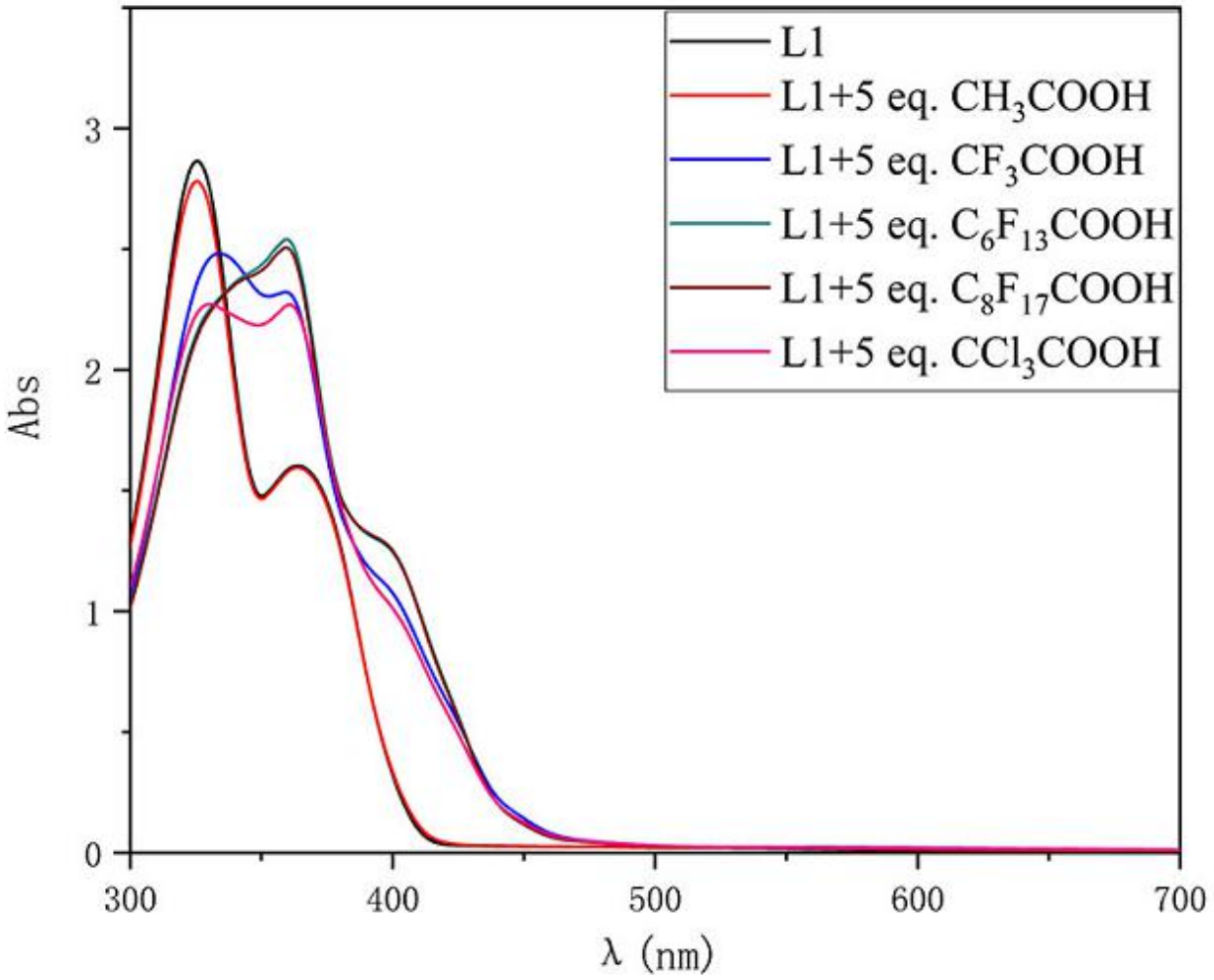
Acid



1: L1
2: L1 + CH_3COOH
3: L1 + CF_3COOH
4: L1 + $C_6F_{13}COOH$
5: L1 + $C_8F_{17}COOH$
6: L1 + CCl_3COOH

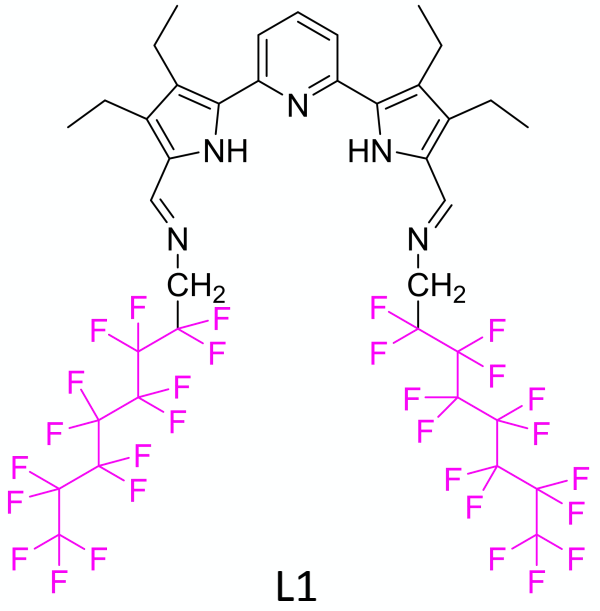
Color changes of a CH_3CN solution of **L1** (3.50×10^{-5} mol/L) upon mixing with a series of carboxylic acids at 298 K.

Absorption Spectral Study



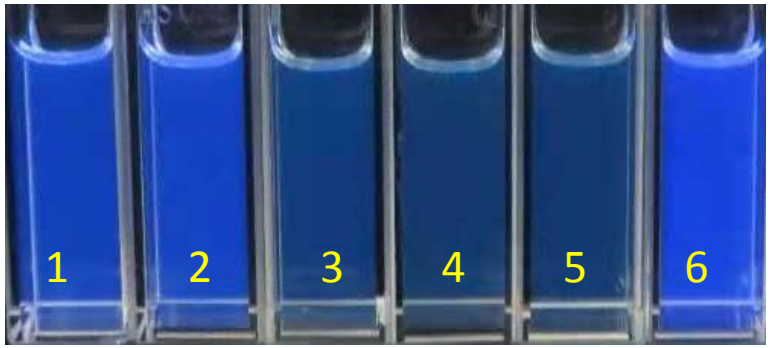
UV-vis absorption spectral changes of **L1** (3.50×10^{-5} mol/L) upon mixing with a series of carboxylic acids in CH_3CN at 298 K.

Color Changes in Fluorescence



L1

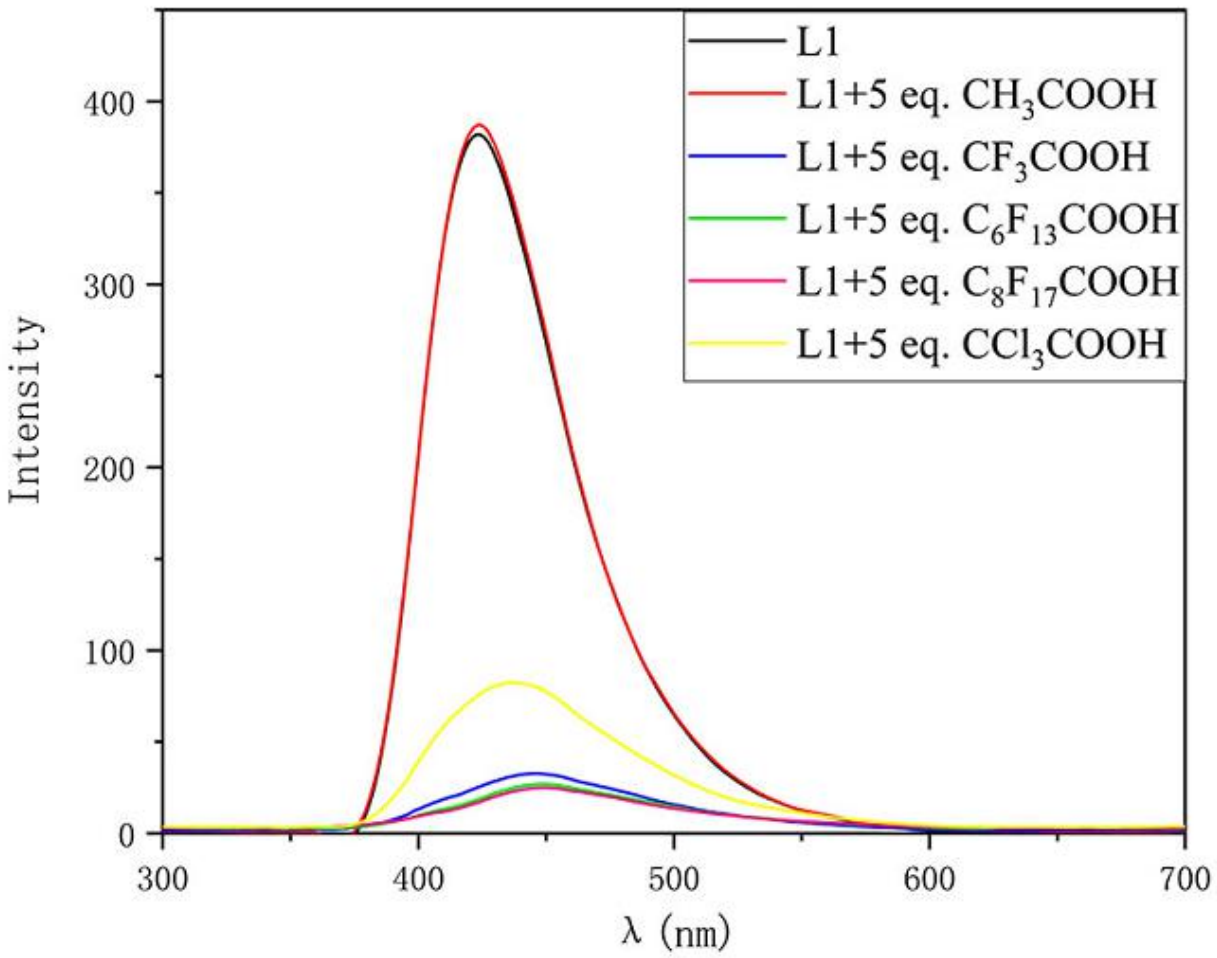
Acid



1: L1
2: L1 + CH_3COOH
3: L1 + CF_3COOH
4: L1 + $C_6F_{13}COOH$
5: L1 + $C_8F_{17}COOH$
6: L1 + CCl_3COOH

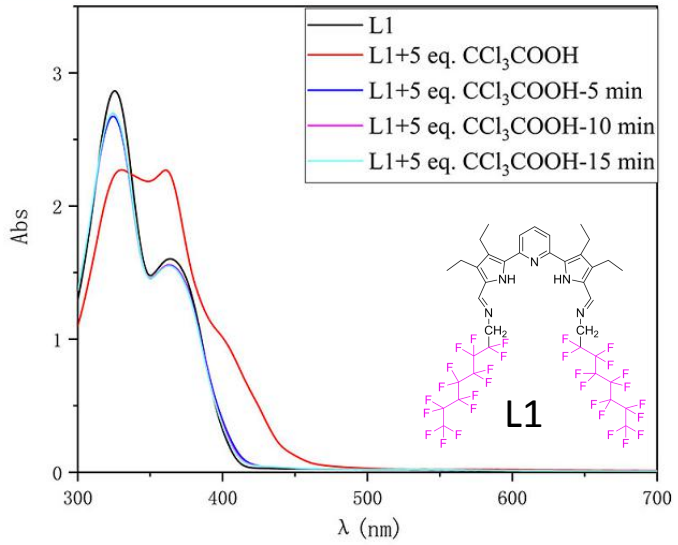
Fluorescence color changes of a CH_3CN solution of **L1** (3.50×10^{-5} mol/L) upon mixing with a series of carboxylic acids. Excitation: 320 nm.

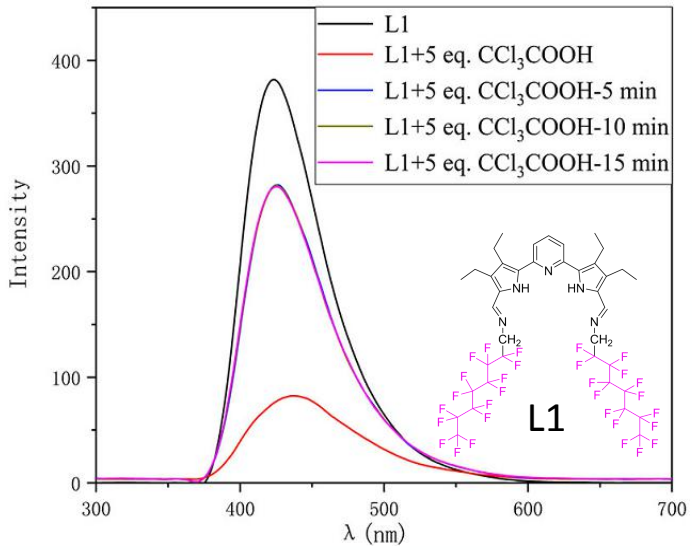
Fluorescence Spectral Study

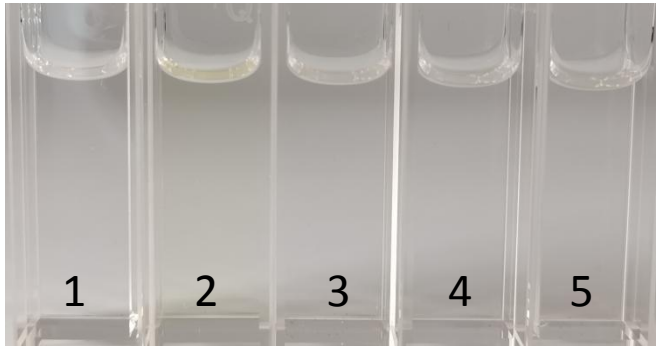


Fluorescence spectral changes of a CH_3CN solution of **L1** (3.50×10^{-5} mol/L) upon mixing with a series of carboxylic acids. Excitation: 320 nm.

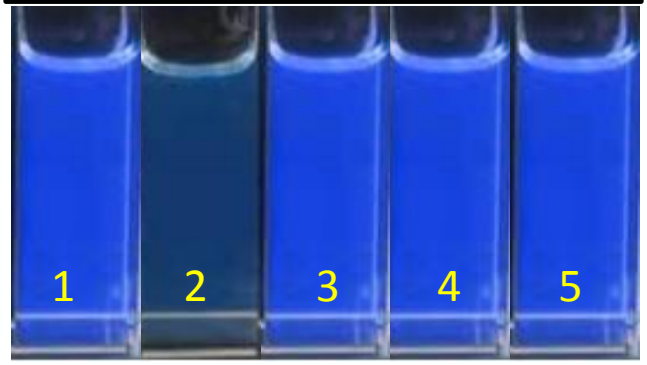
Sensing of Trichloroacetic Acid





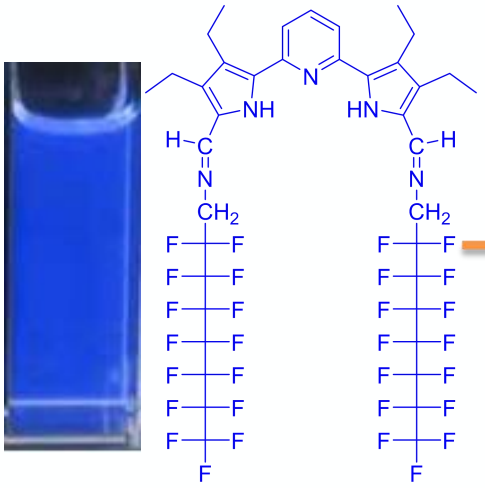


1: L1
2: L1 + CCl3COOH
3: L1 + CCl_3COOH / 5 min
4: L1 + CCl_3COOH / 10 min
5: L1 + CCl_3COOH / 15 min



Fluorescence spectroscopy and UV-vis absorption spectral titrations of **L1** (3.50×10^{-5} mol/L) with of trichloroacetic acid in CH_3CN with time.

Summary



CH_3COOH
CCl_3COOH

No Change
in Fluorescence

CF_3COOH
$C_6F_{13}COOH$
$C_8F_{17}COOH$

Change
In Fluorescence

Thank you for
your attention!!!