

## Yu Xiang

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### EDUCATION

PhD in Chemistry	Tsinghua University	Beijing, China	09/2004 - 07/2009
Thesis title: Synthesis and analytical applications of rhodamine derivatives			
Advisor: Prof. Aijun Tong			
B.S. in Chemistry	Tsinghua University	Beijing, China	09/2000 - 07/2004
Thesis title: Synthesis and characterization of some phosphoglycosides			
Advisor: Prof. Yong Ju			

### WORK EXPERIENCE

Associate Professor, Tsinghua University, Beijing, China	09/2013 – present
Postdoctoral Research Associate, University of Illinois at Urbana-Champaign, Urbana, IL, USA (Advisor: Prof. Yi Lu).	07/2009 - 08/2013

### RESEARCH INTEREST

Chemical modification of oligonucleotides through sulfur chemistry.  
Artificially modified oligonucleotides as tools for analytical chemistry and chemical biology.

### PUBLICATION LIST

#### As Principle Investigator (2014-present):

1. Wang, J. Y.; Shang, J. C.; Qin, Z. C.; Tong, A. J.; Xiang, Y.\*, Selective and Sensitive Fluorescence "Turn-On" Detection of 4-Thiouridine in Nucleic Acids via Oxidative Amination. *Chemical Communications* **2019**, 55, 13096-13099.
2. Xiao, L.#; Gu, C. M.#; Xiang, Y.\*, Orthogonal Activation of RNA-Cleaving DNazymes in Live Cells by Reactive Oxygen Species. *Angewandte Chemie-International Edition* **2019**, 58, 14167-14172.
3. Feng, M. L.; Gu, C. M.; Sun, Y. P.; Zhang, S. Y.; Tong, A. J.; Xiang, Y.\*, Enhancing Catalytic Activity of Uranyl-Dependent DNzyme by Flexible Linker Insertion for More Sensitive Detection of Uranyl Ion. *Analytical Chemistry* **2019**, 91, 6608-6615.
4. Feng, M. L.; Ruan, Z. Y.; Shang, J. C.; Xiao, L.; Tong, A. J.; Xiang, Y.\*, Photocaged G-Quadruplex DNzyme and Aptamer by Post-Synthetic Modification on Phosphodiester Backbone. *Bioconjugate Chemistry* **2017**, 28 (2), 549-555.
5. Xiao, L.; Zhou, Z. J.; Feng, M. L.; Tong, A. J.; Xiang, Y.\*, Cationic Peptide Conjugation Enhances the Activity of Peroxidase-Mimicking DNazymes. *Bioconjugate Chemistry* **2016**, 27 (3), 621-627.
6. Xiao, L.; Xiang, Y.\*, Quantification of Total Phosphorothioate in Bacterial DNA by a Bromoimane-Based Fluorescence Method. *Biotechnology Journal* **2016**, 11 (6), 824-830.
7. Wang, X. Y.; Feng, M. L.; Xiao, L.; Tong, A. J.; Xiang, Y.\*, Postsynthetic Modification of DNA Phosphodiester Backbone for Photocaged DNzyme. *ACS Chemical Biology* **2016**, 11 (2), 444-451.

8. Wang, X. Y.; Song, P. S.; Peng, L.; Tong, A. J.; Xiang, Y.\*, Aggregation-Induced Emission Luminogen-Embedded Silica Nanoparticles Containing DNA Aptamers for Targeted Cell Imaging. *ACS Applied Materials & Interfaces* **2016**, *8* (1), 609-616.
9. Peng, L.; Zheng, Y.; Wang, X. Y.; Tong, A. J.; Xiang, Y.\*, Photoactivatable Aggregation-Induced Emission Fluorophores with Multiple-Color Fluorescence and Wavelength-Selective Activation. *Chemistry-a European Journal* **2015**, *21* (11), 4326-4332.
10. Tao, J.; Song, P. S.; Sato, Y.; Nishizawa, S.; Teramae, N.; Tong, A. J.; Xiang, Y.\*, A Label-Free and Sensitive Fluorescent Method for the Detection of Uracil-DNA Glycosylase Activity. *Chemical Communications* **2015**, *51* (5), 929-932.

**Coauthor works as PI (2014-present):**

11. Zheng, Y.; Ding, Y. W.; Ren, J. J.; Xiang, Y.; Shuai, Z. G.\*; Tong, A. J.\*, Simultaneously and Selectively Imaging a Cytoplasm Membrane and Mitochondria Using a Dual Colored Aggregation-Induced Emission Probe, *Analytical Chemistry*, **2020**, *11*, 14494-14500.
12. Zheng, Y.; Panatdasirisuk, W.; Liu, J. Q.; Tong, A. J.; Xiang, Y.; Yang, S.\*, Patterned, Wearable UV Indicators from Electrospun Photochromic Fibers and Yarns, *Advanced Materials Technology*, **2020**, *5*, 2000564.
13. Peng, L.; Wei, R. R.; Guo, Y. F.; Zheng, X. K.; Zheng, Y.; Ding, Y. W.; Xiang, Y.; Tong, A. J.\*, Tuning Emission Wavelength of Polymorphous Crystal via Controllable Alkyl Chain Stacking and Its Vapor- and Thermo-Responsive Fluorescence. *Chemistry-a European Journal* **2019**, *25*, 8043-8052.
14. Peng, L.; Xiao, L.; Ding, Y. W.; Xiang, Y.; Tong, A. J.\*, A Simple Design of Fluorescent Probes for Indirect Detection of Beta-Lactamase Based on AIE and ESIPT Processes. *Journal of Materials Chemistry B* **2018**, *6*, 3922-3926.
15. Zheng, Y.; Zheng, X. K.; Xiang, Y.; Tong, A. J.\*, Photoactivatable Aggregation-Induced Emission of Triphenylmethanol. *Chemical Communications* **2017**, *53*, 11130-11133.
16. Zhang, X. K.; Zheng, Y.; Peng, L.; Xiang, Y.; Tong, A. J.\*, Mechanoresponsive Fluorescence of 2-Aminobenzophenone Derivatives Based on Amorphous Phase to Crystalline Transformation with High "Off On" Contrast Ratio. *Journal of Physical Chemistry C* **2017**, *121*, 21610-21615.
17. Chen, X. T.\*; Peng, L.; Feng, M. L.; Xiang, Y.; Tong, A. J.; He, L. F.; Liu, B.; Tang, Y. P., An Aggregation Induced Emission Enhancement-Based Ratiometric Fluorescent Sensor for Detecting Trace Uranyl Ion (UO<sub>2</sub><sup>2+</sup>) and the Application in Living Cells Imaging. *Journal of Luminescence* **2017**, *186*, 301-306.
18. Li, Y. J.; Wang, C.; Zhu, Y. B.; Zhou, X. H.; Xiang, Y.; He, M.; Zeng, S. Y.\*, Fully Integrated Graphene Electronic Biosensor for Label-free Detection of Lead (II) Ion Based on G-Quadruplex Structure-Switching. *Biosensors and Bioelectronics* **2017**, *89*, 758-763.
19. Li, J. L.; Chen, Z. P.; Xiang, Y.; Zhou, L. L.; Wang, T.; Zhang, Z.; Sun, K. X.; Yin, D.; Li, Y.; Xie, G. M.\*, An Electrochemical Biosensor for Double-Stranded Wnt7B Gene Detection Based on Enzymatic Isothermal Amplification. *Biosensors and Bioelectronics* **2016**, *86*, 75-82.
20. Zhang, J. J.; Shen, Z.; Xiang, Y.; Lu, Y.\*, Integration of Solution-Based Assays onto Lateral Flow Device for One-Step Quantitative Point-of-Care Diagnostics Using Personal Glucose Meter. *ACS Sensors* **2016**, *1*, 1091-1096.
21. Zhang, Z.; Li, J. L.; Yao, J.; Wang, T.; Yin, D.; Xiang, Y.; Chen, Z. P.; Xie, G. M.\*, Energy Driven Cascade Recognition for Selective Detection of Nucleic Acids with High Discrimination Factor at Room Temperature. *Biosensors & Bioelectronics* **2016**, *79*, 488-494.
22. Zhang, J. J.; Xiang, Y.; Wang, M.; Basu, A.; Lu, Y.\*, Dose-Dependent Response of Personal Glucose Meters to Nicotinamide Coenzymes: Applications to Point-of-Care Diagnostics of Many Non-Glucose

- Targets in a Single Step. *Angewandte Chemie-International Edition* **2016**, *55* (2), 732-736.
23. Han, S. T.; Zhou, X. H.; Tang, Y. F.; He, M.\*; Zhang, X. Y.; Shi, H. C.; Xiang, Y., Practical, Highly Sensitive, and Regenerable Evanescent-Wave Biosensor for Detection of Hg<sup>2+</sup> and Pb<sup>2+</sup> in Water. *Biosensors & Bioelectronics* **2016**, *80*, 265-272.
  24. Gu, C. M.; Xiang, Y.\*; Guo, H. L.; Shi, H. C.\*, Label-Free Fluorescence Detection of Melamine with a Truncated Aptamer. *Analyst* **2016**, *141* (14), 4511-4517.
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  26. Zhang, J. J.; Xiang, Y.; Novak, D. E.; Hoganson, G. E.; Zhu, J. J.; Lu, Y.\*, Using a Personal Glucose Meter and Alkaline Phosphatase for Point-of-Care Quantification of Galactose-1-Phosphate Uridyltransferase in Clinical Galactosemia Diagnosis. *Chemistry-an Asian Journal* **2015**, *10* (10), 2221-2227.
  27. Yang, J.; Xiang, Y.; Song, C.; Liu, L. Z.; Jing, X. Y.; Xie, G. M.\*; Xiang, H.\*, Quadruple Signal Amplification Strategy Based on Hybridization Chain Reaction and an Immuno-electrode Modified with Graphene Sheets, a Hemin/G-Quadruplex DNAzyme Concatamer, and Alcohol Dehydrogenase: Ultrasensitive Determination of Influenza Virus Subtype H7n9. *Microchimica Acta* **2015**, *182* (15-16), 2377-2385.
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  29. Yan, D. J.; Li, W.; Xiang, Y.; Wen, G. B.; Lin, Y. W.\*; Tan, X. S.\*, A Novel Tyrosine-Heme C-O Covalent Linkage in F43y Myoglobin: A New Post-Translational Modification of Heme Proteins. *ChemBiochem* **2015**, *16* (1), 47-50.
  30. Wang, R. Y.; Xiang, Y.; Zhou, X. H.\*; Liu, L. H.; Shi, H. C., A Reusable Aptamer-Based Evanescent Wave All-Fiber Biosensor for Highly Sensitive Detection of Ochratoxin A. *Biosensors & Bioelectronics* **2015**, *66*, 11-18.
  31. Liu, H. L.; Wei, R. R.; Xiang, Y.; Tong, A. J.\*, Fluorescence Turn-on Detection of Pyrophosphate Based on Aggregation-Induced Emission Property of 5-Chlorosalicylaldehyde Azine. *Analytical Methods* **2015**, *7* (2), 753-758.
  32. Liu, H. L.; Wang, X. Y.; Xiang, Y.; Tong, A. J.\*, Fluorescence Turn-on Detection of Cysteine over Homocysteine and Glutathione Based on "Esipt" and "Aie". *Analytical Methods* **2015**, *7* (12), 5028-5033.
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  35. Song, P. S.; Xiang, Y.; Wei, R. R.; Tong, A. J.\*, A Fluorescent Chemosensor for Cu<sup>2+</sup> Detection in Solution Based on Aggregation-Induced Emission and Its Application in Fabricating Cu<sup>2+</sup> Test Papers. *Journal of Luminescence* **2014**, *153*, 215-220.
  36. Peng, L.; Zhou, Z. J.; Wang, X. Y.; Wei, R. R.; Li, K.; Xiang, Y.; Tong, A. J.\*, A Ratiometric Fluorescent Chemosensor for Al<sup>3+</sup> in Aqueous Solution Based on Aggregation-Induced Emission and Its Application in Live-Cell Imaging. *Analytica Chimica Acta* **2014**, *829*, 54-59.
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- System Based on Rhodamine B Salicylaldehyde Hydrazone Metal Complex. *Journal of the American Chemical Society* **2014**, *136* (4), 1643-1649.
38. Li, K.; Xiang, Y.; Tong, A. J.\*; Tang, B. Z.\*, Readily Accessible Rhodamine B-Based Photoresponsive Material. *Science China-Chemistry* **2014**, *57* (2), 248-251.
- During Postdoc or PhD: (2005-2013):**
39. Xiang, Y.; Wu, P. W.; Tan, L. H.; Lu, Y.\*, DNAzyme-Functionalized Gold Nanoparticles for Biosensing. In *Biosensors Based on Aptamers and Enzymes*, Gu, M. B.; Kim, H. S., Eds. **2014**, pp 93-120.
40. Xiang, Y.; Lu, Y.\*, DNA as Sensors and Imaging Agents for Metal Ions. *Inorganic Chemistry* **2014**, *53* (4), 1925-1942.
41. Xiang, Y.; Wang, Z. D.; Xing, H.; Lu, Y.\*, Expanding DNAzyme Functionality through Enzyme Cascades with Applications in Single Nucleotide Repair and Tunable DNA-Directed Assembly of Nanomaterials. *Chemical Science* **2013**, *4* (1), 398-404.
42. Xiang, Y.; Lu, Y.\*, An Invasive DNA Approach toward a General Method for Portable Quantification of Metal Ions Using a Personal Glucose Meter. *Chemical Communications* **2013**, *49* (6), 585-587.
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44. Xing, H.; Wang, Z. D.; Xu, Z. D.; Wong, N. Y.; Xiang, Y.; Liu, G. L. G.; Lu, Y.\*, DNA-Directed Assembly of Asymmetric Nanoclusters Using Janus Nanoparticles. *ACS Nano* **2012**, *6* (1), 802-809.
45. Xiang, Y.; Lu, Y.\*, Using Commercially Available Personal Glucose Meters for Portable Quantification of DNA. *Analytical Chemistry* **2012**, *84* (4), 1975-1980.
46. Xiang, Y.; Lu, Y.\*, Portable and Quantitative Detection of Protein Biomarkers and Small Molecular Toxins Using Antibodies and Ubiquitous Personal Glucose Meters. *Analytical Chemistry* **2012**, *84* (9), 4174-4178.
47. Xiang, Y.; Lu, Y.\*, Expanding Targets of DNAzyme-Based Sensors through Deactivation and Activation of DNAzymes by Single Uracil Removal: Sensitive Fluorescent Assay of Uracil-DNA Glycosylase. *Analytical Chemistry* **2012**, *84* (22), 9981-9987.
48. Song, P. S.; Xiang, Y.; Xing, H.; Zhou, Z. J.; Tong, A. J.\*; Lu, Y.\*, Label-Free Catalytic and Molecular Beacon Containing an Abasic Site for Sensitive Fluorescent Detection of Small Inorganic and Organic Molecules. *Analytical Chemistry* **2012**, *84* (6), 2916-2922.
49. Liu, H.; Xiang, Y.; Lu, Y.; Crooks, R. M.\*, Aptamer-Based Origami Paper Analytical Device for Electrochemical Detection of Adenosine. *Angewandte Chemie-International Edition* **2012**, *51* (28), 6925-6928.
50. Xiang, Y.; Lu, Y.\*, Using Personal Glucose Meters and Functional DNA Sensors to Quantify a Variety of Analytical Targets. *Nature Chemistry* **2011**, *3* (9), 697-703.
51. Song, P. S.; Chen, X. T.; Xiang, Y.; Huang, L.; Zhou, Z. J.; Wei, R. R.; Tong, A. J.\*, A Ratiometric Fluorescent Ph Probe Based on Aggregation-Induced Emission Enhancement and Its Application in Live-Cell Imaging. *Journal of Materials Chemistry* **2011**, *21* (35), 13470-13475.
52. Chen, X. T.; Xiang, Y.; Song, P. S.; Wei, R. R.; Zhou, Z. J.; Li, K.; Tong, A. J.\*, P-Carboxyl-N-Salicylideneanilines: Simple but Efficient Chromophores for One-Dimensional Microrods with Aggregation-Induced Emission Enhancement (Aiee) Characteristics. *Journal of Luminescence* **2011**, *131* (7), 1453-1459.
53. Chen, X. T.; Wei, R. R.; Xiang, Y.; Zhou, Z. J.; Li, K.; Song, P. S.; Tong, A. J.\*, Organic Crystalline Solids Response to Piezo/Thermo Stimulus: Donor-Acceptor (D-a) Attached Salicylaldehyde Azine Derivatives. *Journal of Physical Chemistry C* **2011**, *115* (29), 14353-14359.

54. Zhang, X. B.; Wang, Z. D.; Xing, H.; Xiang, Y.; Lu, Y.\*, Catalytic and Molecular Beacons for Amplified Detection of Metal Ions and Organic Molecules with High Sensitivity. *Analytical Chemistry* **2010**, *82* (12), 5005-5011.
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56. Li, N.; Xiang, Y.; Tong, A. J.\*, Highly Sensitive and Selective "Turn-on" Fluorescent Chemodosimeter for Cu<sup>2+</sup> in Water Via Cu<sup>2+</sup>-Promoted Hydrolysis of Lactone Moiety in Coumarin. *Chemical Communications* **2010**, *46* (19), 3363-3365.
57. Li, N.; Tang, W. X.; Xiang, Y.; Tong, A. J.\*; Jin, P. Y.; Ju, Y., Fluorescent Salicylaldehyde Hydrazone as Selective Chemosensor for Zn<sup>2+</sup> in Aqueous Ethanol: A Ratiometric Approach. *Luminescence* **2010**, *25* (6), 445-451.
58. Chen, X. T.; Xiang, Y.; Tong, A. J.\*, Facile, Sensitive and Selective Fluorescence Turn-on Detection of Hsa/Bsa in Aqueous Solution Utilizing 2,4-Dihydroxyl-3-Iodo Salicylaldehyde Azine. *Talanta* **2010**, *80* (5), 1952-1958.
59. Chen, X. T.; Xiang, Y.; Li, N.; Song, P. S.; Tong, A. J.\*, Fluorescence Turn-on Detection of Protamine Based on Aggregation-Induced Emission Enhancement Characteristics of 4-(6'-Carboxyl)Hexyloxysalicylaldehyde Azine. *Analyst* **2010**, *135* (5), 1098-1105.
60. Xiang, Y.; Tong, A. J.\*; Lu, Y.\*, Abasic Site-Containing DNAzyme and Aptamer for Label-Free Fluorescent Detection of Pb<sup>2+</sup> and Adenosine with High Sensitivity, Selectivity, and Tunable Dynamic Range. *Journal of the American Chemical Society* **2009**, *131* (42), 15352-15357.
61. Tang, W. X.; Xiang, Y.\*; Tong, A. J.\*, Salicylaldehyde Azines as Fluorophores of Aggregation-Induced Emission Enhancement Characteristics. *Journal of Organic Chemistry* **2009**, *74* (5), 2163-2166.
62. Li, N.; Xiang, Y.; Chen, X. T.; Tong, A. J.\*, Salicylaldehyde Hydrazones as Fluorescent Probes for Zinc Ion in Aqueous Solution of Physiological Ph. *Talanta* **2009**, *79* (2), 327-332.
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64. Xiang, Y.; Tong, A.\*, Ratiometric and Selective Fluorescent Chemodosimeter for Cu(I) by Cu(I)-Induced Oxidation. *Luminescence* **2008**, *23* (1), 28-31.
65. Xiang, Y.; Li, M.; Chen, X. T.; Tong, A. J.\*, Highly Sensitive and Selective Optical Chemosensor for Determination of Cu<sup>2+</sup> in Aqueous Solution. *Talanta* **2008**, *74* (5), 1148-1153.
66. Li, Z. F.; Xiang, Y.; Tong, A.\*, Ratiometric Chemosensor for Fluorescent Determination of Zn<sup>2+</sup> in Aqueous Ethanol. *Analytica Chimica Acta* **2008**, *619* (1), 75-80.
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72. Li, N.; Mei, L.; Xiang, Y.; Tong, A. J.\*; Nishizawa, S.; Teramae, N., Fluorescence Detection of Single-Nucleotide Polymorphisms with Two Simple and Low Cost Methods: A Double-DNA-Probe Method and a Bulge Form Method. *Analytica Chimica Acta* **2007**, 597 (1), 97-102.
73. Xiang, Y.; Tong, A. J.\*; Jin, P. Y.; Ju, Y., New Fluorescent Rhodamine Hydrazone Chemosensor for Cu(II) with High Selectivity and Sensitivity. *Organic Letters* **2006**, 8 (13), 2863-2866.
74. Xiang, Y.; Tong, A. J.\*, A New Rhodamine-Based Chemosensor Exhibiting Selective Fe-III-Amplified Fluorescence. *Organic Letters* **2006**, 8 (8), 1549-1552.
75. Xiang, Y.; Tong, A. J.\*, Simple and Efficient Ratiometric Fluorescent Probes for near-Neutral Ph in Aqueous Solutions. *Chemistry Letters* **2005**, 34 (7), 926-927.

## PATENTS

1. Xiang, Y.; Feng, M. L.; Wang, X. Y.; Tong, A. J.; He, M.: The reaction and products of phosphorothiate derivatives reacting with excess amount of bromoacetyl aromatic compounds. Chinese Patent ZL201510882377.9.
2. Xiang, Y.; He, M.: Several aptamers for bentazon and their derivatives. Chinese Patent ZL201510876035.6.
3. Lu, Y.; Xiang, Y.: Personal glucose meters for detection and quantification of a broad range of analytes. International Patent WO 2011150186; US Patent 8,945,943B2
4. Lu, Y.; Xiang, Y.: Label-free functional nucleic acid sensors for detecting target agents. US Patent 8,933,210B2

## INVITED TALKS

1. Xiang, Y: "Chemically Modified Oligonucleotides for Precise Biosensing and Gene Regulation", 11<sup>th</sup> Chinese National Conference on Chemical Biology, 2019, Guangzhou, China
2. Xiang, Y: "Improving the analytical performance of DNazymes", Young Investigator Symposium of Chemical Biology and Nanomedicine, 2018, Changsha, China.
3. Xiang, Y: "Aptamer-functionalized silica NPs loaded with AIE fluorophores for tumor cell imaging", 3rd International Conference on DNA Nanotechnology, 2014, Suzhou, China.
4. Xiang, Y: "Peptide-conjugated Peroxidase-mimicking DNzyme with Enhanced Catalytic Activity", 6th International Symposium on Bioanalysis, Biomedical Engineering and Nanotechnology (ISBBN), 2014.
5. Xiang, Y: "Point-of-care diagnosis and detection available to the public by using commercially available glucose meters to quantify a variety of non-glucose targets", 14th Beijing Conference and Exhibition on Instrumental Analysis, 2011.
6. Xiang, Y: "Label-free fluorescent functional DNA sensors based on unmodified DNA containing a vacant site", 2010 International Chemical Congress of Pacific Basin Societies (Pacifichem), 2010.

## TEACHING AT TSINGHUA UNIVERSITY (Course #)

Instrument Analysis B (40440122)  
Scientific Research Training (40440253, -263, -273)  
Lab Session of Instrumental Analysis A (40440102)  
Lab Session of Chemical Biology (40440341)