
Wenqi “Vince” Liu PhD

Incoming Assistant Professor (Start in Aug. 2021)
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EDUCATION AND PROFESSIONAL TRAINING

Postdoctoral Fellow Northwestern University / Evanston / USA

Advisor: Fraser Stoddart (2016 Nobel Laureate) 2018–2021

PhD University of Notre Dame / Notre Dame / USA

Advisor: Bradley Smith 2013–2018

Thesis: Molecular Recognition Using Tetralactam Macrocycle and Development of Synthavidin Technology

BS Shandong University / Jinan / China

Advisor: Aiyu Hao 2009–2013

RESEARCH EXPERIENCE

Supramolecular Chemistry and Molecular Nanotechnology **Evanston / IL**

- Design and synthesis of new water-soluble receptors and their molecular recognitions with dyes in water
- Construction of mechanically interlocked molecules including suitanes, daisy chains, poly[n]rotaxanes, and poly[n]catenanes
- Development of gold mining technology using molecular receptors

Supramolecular Organic Chemistry **Notre Dame / IN**

- Development of *Synthavidin* technology for bioconjugation and disease diagnostics
- Design and synthesis of functional fluorescence dyes and their supramolecular molecular complexes with tetralactam macrocycles for bioimaging, photothermal heating and enzyme assay
- Tuning the kinetics of macrocycle threading over polymers and steric speed bumps covering operation rate from 10^2 to 10^9 $M^{-1}s^{-1}$
- Enhancement of host-guest binding affinities in water up to 10^{11} M^{-1}
- Surface functionalization of liposomes
- Development of molecular receptors for precious metal coordination complexes and anions

Chemistry **Jinan / Shandong**

- Development of stimuli-responsive organogels based on the self-assembly of cyclodextrin
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AWARDS

Dow Chemical Company Outstanding Graduate Student Award 2018
(Highest honor for Graduate Students at the Department of Chemistry and
Biochemistry, University of Notre Dame)

PUBLICATIONS

- (27) **Liu, W.**; Stoddart, J.F. Emergent Behavior in Nanoconfined Molecular Containers. *Chem*, **2021**, *7*, 919–947.
- (26) **Liu, W.**; Jones, L.O.; Wu, H.; Stern, C.L.; Sponenborg, R.A.; Schatz, G.C.; Stoddart, J.F. Supramolecular Gold Stripping from Activated Carbon Using α -Cyclodextrin. *J. Am. Chem. Soc.* **2021**, *143*, 1984–1992. ([Front Cover](#))
- (25) Anamimoghadam, O.; Jones, L.O.; Cooper, J.A.; Beldjoudi, Y.; Nguyen, M.T; **Liu, W.**; Krzyaniak, M.D.; Pezzato, C.; Stern, C.L.; Patel, H.A.; Wasielewski, M.R.; Schatz, G.C.; Stoddart, J.F. Discrete Open-Shell Tris(Bipyridinium Radical Cationic) Inclusion Complexes in the Solid State. *J. Am. Chem. Soc.* **2021**, *143*, 163–175.
- (24) Cai, K.; Cui, B.; Song, B.; Wang, H.; Qiu, Y.; Jones, L.O.; **Liu, W.**; Shi, Y.; Vemuri, S.; Shen, D.; Jiao, T.; Zhang, L.; Wu, H.; Chen, H.; Jiao, Y.; Wang, Y.; Stern, C.L.; Li, H.; Schatz, G.C.; Li, X.; Stoddart, J.F. Radical Cyclic [3] Daisy Chains. *Chem*, **2021**, *7*, 174–189.
- (23) Shaffer, C.; **Liu, W.**; Oliver, A.G.; Smith, B.D. Supramolecular Paradigm for Capture and Co-Precipitation of Gold (III) Coordination Complexes. *Chem. Eur. J.* **2021**, *27*, 751–757. ([Hot Paper](#))
- (22) Wu, W.; Wang, Y.; Jones, L. O.; **Liu, W.**; Song, B.; Cui, Y.; Cai, K.; Zhang, L.; Shen, D.; Chen, X.; Jiao, Y.; Stern, C. L.; Li, X.; Schatz, G. C.; Stoddart, J.F. Ring-in-ring(s) complexes exhibiting tunable multicolor photoluminescence. *J. Am. Chem. Soc.* **2020**, *142*, 16849–16860.
- (21) Qiu, Y.; Song, B.; Pezzato, C.; Shen, D.; **Liu, W.**; Zhang, L.; Feng, Y.; Guo, Q.-H.; Cai, K.; Li, W.; Chen, H.; Nguyen, M. T.; Shi, Y.; Cheng, C.; Astumian, D. R.; Li, X.; Stoddart, J. F. A Precise Polyrotaxane Synthesizer. *Science*. **2020**, *368*, 1247–1253. ([Highlighted by C&EN, Chemistry World, Northwestern Now, UMaine News, and PHYS.ORG.](#))
- (20) **Liu, W.**; Stern, C. L.; Stoddart, J. F. Suit[4]ane. *J. Am. Chem. Soc.* **2020**, *142*, 10273–10278. ([Highlight by Chemistry View](#))
- (19) **Liu, W.**; Lin, C.; Webber, A. J.; Stern, C. L.; Yong, M. R.; Wasielewski, R. M.; Stoddart, J. F. Cyclophane-Sustained Ultrastable Porphyrins. *J. Am. Chem. Soc.* **2020**, *142*, 8938–8945. ([Supplementary Cover](#))
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- (18) **Liu, W.**; Bobbala, S.; Stern, C. L.; Hornick, J.; Liu, Y.; Enciso, A. E.; Scott, E. A.; Stoddart, J. F. XCage: A Tricyclic Octacationic Receptor for Perylene Diimide with Picomolar Affinity in Water. *J. Am. Chem. Soc.* **2020**, *142*, 3165–3173.
- (17) **Liu, W.**; Oliver, A. G.; Smith, B. D. Stabilization and Extraction of Fluoride Anion Using a Tetralactam Receptor. *J. Org. Chem.* **2019**, *84*, 4050–4057.
- (16) McGarraugh, H. H.; **Liu, W.**; Matthews, B. P.; Smith, B. D. Croconaine Rotaxane Dye with 984 nm Absorption: Wavelength-Selective Photothermal Heating. *European J. Org. Chem.* **2019**, *2019*, 3489–3494. (*Invited*)
- (15) **Liu, W.**; McGarraugh, H. H.; Smith, B. D. Fluorescent Thienothiophene-Containing Squaraine Dyes and Threaded Supramolecular Complexes with Tunable Wavelengths between 600–800 nm. *Molecules* **2018**, *23*, 2229. (*Invited*)
- (14) **Liu, W.**; Oliver, A.D.; Smith, B. D. Macrocyclic Receptor for Precious Gold, Platinum, or Palladium Coordination Complexes. *J. Am. Chem. Soc.* **2018**, *140*, 6810-6813. (*Highlighted by Wikipedia, Australia Mining, Minex Forum, Mining.com, Phys. Org., X-Mol*)
- (13) **Liu, W.**; Johnson, A.; Smith, B. D. Guest Back-Folding: A Molecular Design Strategy That Produces A Deep-Red Fluorescent Host/Guest Pair With Picomolar Affinity In Water. *J. Am. Chem. Soc.* **2018**, *140*, 3361-3370. (*Highlighted by X-Mol*)
- (12) Shaw, S.; **Liu, W.**; Fernando Azael Gómez Durán, C.; Schreiber, C.; de Lourdes Betancourt Mendiola, M.; Zhai, C.; Roland, F.; Padanilam, S.; Smith, B. D. Non-Covalently Pre-Assembled High-Performance Near-Infrared Fluorescent Molecular Probes for Cancer Imaging. *Chem. Eur. J.* **2018**, *24*, 13821–13829. (*Hot paper*)
- (11) **Liu, W.**; Gómez-Durán, C. F. A.; Smith, B. D. Fluorescent Neuraminidase Assay Based on Supramolecular Dye Capture after Enzymatic Cleavage. *J. Am. Chem. Soc.* **2017**, *139*, 6390-6395. (*Highlighted by ABC News, Bel Marra Health, Bionity, EurekAlert!, Newatlas, News Medical Life Science, Inside Indiana Business, Now. Northrop Grumman, Phys. Org., Science Daily, WonderHowTo*)
- (10) **Liu, W.**; Samanta, S. K.; Smith, B. D.; Isaacs, L. Synthetic Mimics of Biotin/(Strept)avidin. *Chem. Soc. Rev.* **2017**, *46*, 2391–2403. (*Invited*)
- (9) Shaw, S.; **Liu, W.**; Brennan, S.P.; Betancourt-Mendiola, M.L.; Smith, B. D. Non-Covalent Assembly Method That Simultaneously Endows A Liposome Surface With Targeting Ligands, Protective PEG Chains, And Deep-Red Fluorescence Reporter Groups. *Chem. Eur. J.* **2017**, 12646-12654. (*Hot Paper*)
- (8) Gómez-Durán, C. F. A.; **Liu, W.**; Betancourt-Mendiola, M.L.; Smith, B. D. Structural Control of Kinetics for Macrocycle Threading by Fluorescent Squaraine Dye in Water. *J. Org. Chem.* **2017**, *82*, 8334-8341. (*Featured Article*)
- (7) Hu, D.; Jin, S.; Shi, Y.; Wang, X.; Graff, R.; **Liu, W.**; Zhu, M.; Gao, H. Preparation of Hyperstar Polymers with Encapsulated Au₂₅(SR)₁₈ Clusters as Recyclable Catalysts for Nitrophenol Reduction. *Nanoscale* **2017**, *9*, 3929-3636.
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- (6) **Liu, W.**; Peck, E. M.; Smith, B. D. High Affinity Macrocyclic Threading by A Near-Infrared Croconaine Dye with Flanking Polymer Chains. *J. Phys. Chem. B* **2016**, *120*, 995–1001.
 - (5) **Liu, W.**; Peck, E. M.; Hendzel, K. D.; Smith, B. D. Sensitive Structural Control of Macrocyclic Threading by A Fluorescent Squaraine Dye Flanked by Polymer Chains. *Org. Lett.* **2015**, *17*, 5268–5271.
 - (4) Peck, E. M.; **Liu, W.**; Spence, G. T.; Shaw, S. K.; Davis, A. P.; Destecroix, H.; Smith, B. D. Rapid Macrocyclic Threading by A Fluorescent Dye–Polymer Conjugate in Water With Nanomolar Affinity. *J. Am. Chem. Soc.* **2015**, *137*, 8668–8672.
 - (3) Li, Z.; **Liu, W.**; Hao, A. Gel-Sol-Gel' Evolution Triggered by Formic Acid. *Colloids Surfaces A Physicochem. Eng. Asp.* **2014**, *451*, 25–32.
 - (2) Hou, Y.; Li, S.; Sun, T.; Yang, J.; Xing, P.; **Liu, W.**; Hao, A. Organogels Based on β -Cyclodextrin System with Molecular Recognition Property. *J. Incl. Phenom. Macrocycl. Chem.* **2014**, *80*, 217–224.
 - (1) **Liu, W.**; Xing, P.; Xin, F.; Hou, Y.; Sun, T.; Hao, J.; Hao, A. Novel Double Phase Transforming Organogel Based on β -Cyclodextrin in 1,2-Propylene Glycol. *J. Phys. Chem. B* **2012**, *116*, 13106–13113.
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PATENTS

- (4) Stoddart, J. F.; **Liu, W.**; Supramolecular Gold Stripping from Activated Carbon Using α -Cyclodextrin. Provision Patent Application Filed.
 - (3) Stoddart, J. F.; **Liu, W.**; Cyclophane-Sustained High Performance Porphyrins. Provisional Patent Application Filed.
 - (2) Stoddart, J. F.; **Liu, W.**; XCage: Synthesis of An Octacationic Cyclophane and Its Use in Complexation with Perylenediimide Dyes. Provisional Patent Application Filed.
 - (1) Xing, P.; Hao, A.; **Liu, W.**; Non-toxic And Stable Small Molecular Organic Gel And Preparation Method Thereof. CN Patent CN102,627,790 B
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CONFERENCE PRESENTATIONS

- Liu, W.**; Gómez-Durán, C. F. A.; Smith, B. D. Fluorescent Neuraminidase Assay Based on Supramolecular Dye Capture after Enzymatic Cleavage. Poster Presentation Delivered at 14th Annual Conference on Foundations of Nanoscience, Snowbird, Utah, April, 2017.
- Liu, W.**; Gómez-Durán, C. F. A.; Smith, B. D. Fluorescent Enzyme Assay Based on Pseudorotaxane Formation. Oral Presentation Delivered at 252th ACS national Meeting, Philadelphia, PA, August, 2016.
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