

Assistant Professor of Chemistry
Macalester College

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Education

09/2014–05/2015 **Postdoctoral Researcher** advised by Prof. Samuel I. Stupp Northwestern University
09/2010–06/2014 **PhD** in Organic Chemistry advised by Prof. J. Fraser Stoddart Northwestern University
08/2006–12/2009 **BS** in Chemistry with two years of research advised by Dr. Yi Liu UC Berkeley

Academic Employment

08/2015–Present **Assistant Professor** of Chemistry Macalester College

Awards and Honors

07/2014 **Outstanding Instructor** EXCEL Program
07/2012 **Ryan Fellowship** International Institute of Nanotechnology
04/2011 **NSF Graduate Research Fellowship** National Science Foundation

Undergraduate Research Mentees

11/2015–Present **Mohammed Modan** Macalester College
11/2015–Present **Penelope Kahn** Macalester College
09/2015–Present **Daniel Lee** Macalester College
Honors Project
09/2013–09/2014 **Michael Hong** '14 Northwestern University
2014 Research Assistantship at UT Dallas
2014 Weinberg Undergraduate Research Grant (\$3000)
12/2010–12/2011 **Marc A. Giesener** '12 Northwestern University
2012 Consultant at Boston Consulting Group

Publications (Undergraduate Co-authors Underlined)

From Graduate and Postdoctoral Research at Northwestern University

28. J. Sun, Y. Wu, Z. Liu, **D. Cao**, Y. Wang, C. Cheng, D. Chen, M. R. Wasielewski, J. F. Stoddart
Visible light-driven artificial molecular switch actuated by radical–radical and donor–acceptor interactions
J. Phys. Chem. A **119**, 6317–6325 (2015).
27. A. C.-H. Sue, R. V. Mannige, H. Deng, **D. Cao**, C. Wang, F. Gándara, J. F. Stoddart, S. Whitelam, O. M. Yaghi
Heterogeneity of functional groups in a metal–organic framework displays magic number ratios
Proc. Nat. Acad. Sci. **112**, 5591–5596 (2015).
26. A. K. Blackburn, A. C.-H. Sue, A. K. Shveyd, **D. Cao**, A. Tayi, A. Narayanan, B. S. Rolczynski, J. M. Szarko, O. A. Bozdemir, R. Wakabayashi, J. A. Lehrman, B. Kahr, L. X. Chen, M. S. Nassar, S. I. Stupp, J. F. Stoddart
Lock-arm supramolecular ordering: A molecular construction set for cocrystallizing organic charge transfer complexes

- J. Am. Chem. Soc.* **136**, 17224–17235 (2014).
25. Z. Liu, G. Liu, Y. Wu, **D. Cao**, J. Sun, S. T. Schneebeli, M. S. Nassar, C. A. Mirkin, J. F. Stoddart
Assembly of supramolecular nanotubes from molecular triangles and 1,2-dihalohydrocarbons
J. Am. Chem. Soc. **136**, 16651–16660 (2014).
24. **D. Cao**, M. Hong, A. K. Blackburn, Z. Liu, J. M. Holcroft, J. F. Stoddart
Two-point halogen bonding between 3,6-dihalopyromellitic diimides
Chem. Sci. **5**, 4242–4248 (2014).
23. Z. Liu, J. Lei, M. Frasconi, X. Li, **D. Cao**, Z. Zhu, S. T. Schneebeli, G. C. Schatz, J. F. Stoddart
A square-planar tetracoordinate oxygen-containing Ti_4O_{17} cluster stabilized by two 1,1'-ferrocenedicarboxylato ligands
Angew. Chem. Int. Ed. **53**, 9193–9197 (2014).
22. M. Frasconi, T. Kikuchi, **D. Cao**, Y. Wu, W.-G. Liu, S. M. Dyar, G. Barin, A. A. Sarjeant, C. L. Stern, R. Carmieli, C. Wang, M. R. Wasielewski, W. A. Goddard, J. F. Stoddart
Mechanical bonds and topological effects in radical dimer stabilization
J. Am. Chem. Soc. **136**, 11011–11026 (2014).
21. C. Jia, H. Li, J. Jiang, J. Wang, H. Chen, **D. Cao**, J. F. Stoddart, X. Guo
Interface-engineered bistable [2]rotaxane-graphene hybrids with logic capabilities
Adv. Mater. **25**, 6752–6759 (2013).
20. K. J. Hartlieb, A. K. Blackburn, S. T. Schneebeli, R. S. Forgan, A. A. Sarjeant, C. L. Stern, **D. Cao**, J. F. Stoddart
Topological isomerism in a chiral handcuff catenane
Chem. Sci. **5**, 90–100 (2013).
19. **D. Cao**, M. Juríček, Z. J. Brown, A. C.-H. Sue, Z. Liu, J. Lei, A. K. Blackburn, S. Grunder, A. A. Sarjeant, A. Coskun, C. Wang, O. K. Farha, J. T. Hupp, J. F. Stoddart
Three-dimensional architectures incorporating stereoregular donor-acceptor stacks
Chem. Eur. J. **19**, 8457–8465 (2013).
18. Z. Liu, M. Frasconi, J. Lei, Z. J. Brown, Z. Zhu, **D. Cao**, J. Iehl, G. Liu, A. C. Fahrenbach, Y. Y. Botros, O. K. Farha, J. T. Hupp, C. A. Mirkin, J. F. Stoddart
Selective isolation of gold facilitated by second-sphere coordination with α -cyclodextrin
Nature Commun. **4**, Article 1855 (2013). (Highlighted in C&EN Magazine)
17. J. C. Barnes, A. C. Fahrenbach, **D. Cao**, S. M. Dyar, M. Frasconi, M. A. Giesener, D. Benítez, E. Tkatchouk, O. Chernyashevskyy, W. H. Shin, H. Li, S. Sampath, C. L. Stern, A. A. Sarjeant, K. J. Hartlieb, Z. Liu, R. Carmieli, Y. Y. Botros, J. W. Choi, A. M. Z. Slawin, J. B. Ketterson, M. R. Wasielewski, W. A. Goddard, J. F. Stoddart
A radically configurable six-state compound
Science **339**, 429–433 (2013). (Highlighted in Nature Chemistry)
16. M. Xue, **D. Cao**, J. F. Stoddart, J. I. Zink
Size-selective pH-operated megagates on mesoporous silica materials
Nanoscale **4**, 7569–7574 (2012).
15. C. Wang, S. M. Dyar, **D. Cao**, A. C. Fahrenbach, N. Horwitz, M. T. Colvin, R. Carmielli, C. L. Stern, S. K. Dey, M. R. Wasielewski, J. F. Stoddart
Tetrathiafulvalene hetero radical cation dimerization in a redox-active [2]catenane
J. Am. Chem. Soc. **134**, 19136–19145 (2012).

14. A. C. Fahrenbach, Z. Zhu, **D. Cao**, W.-G. Liu, H. Li, S. K. Dey, S. Basu, A. Trabolsi, Y. Y. Botros, W. A. Goddard, J. F. Stoddart
Radically enhanced molecular switches
J. Am. Chem. Soc. **134**, 16275–16288 (2012).
13. C. Wang, **D. Cao**, A. C. Fahrenbach, S. Grunder, S. K. Dey, A. A. Sarjeant, J. F. Stoddart
The effects of conformation on the noncovalent bonding interactions in a bistable donor-acceptor [3]catenane
Chem. Commun. **48**, 9245–9247 (2012).
12. A. C. Fahrenbach, C. Bruns, **D. Cao**, J. F. Stoddart
Ground-state thermodynamics of bistable redox-active donor-acceptor mechanically interlocked molecules
Acc. Chem. Res. **45**, 1581–1592 (2012).
11. A. S. Tayi, A. K. Shveyd, A. C.-H. Sue, J. M. Szarko, B. Rolczynski, **D. Cao**, T. J. Kennedy, A. A. Sarjeant, C. L. Stern, W. F. Paxton, W. Wu, S. K. Dey, A. C. Fahrenbach, J. R. Guest, H. Mohseni, L. X. Chen, K. L. Wang, J. F. Stoddart, S. I. Stupp
Room temperature ferroelectricity in supramolecular networks of charge-transfer complexes
Nature **488**, 485–489 (2012). (Highlighted in Nature News and C&EN Magazine)
10. **D. Cao**, C. Wang, M. Giesener, Z. Liu, J. F. Stoddart
A rigid donor-acceptor daisy chain
Chem. Commun. **48**, 6971–6793 (2012).
9. C. Wang, Z. Li, **D. Cao**, Y.-L. Zhao, J. W. Gaines, O. A. Bozdemir, M. W. Ambrogio, M. Frasconi, Y. Y. Botros, J. I. Zink, J. F. Stoddart
Stimulated release of size-selected cargos in succession from mesoporous silica nanoparticles
Angew. Chem. Int. Ed. **51**, 5460–5465 (2012).
8. C. Wang, **D. Cao**, A. C. Fahrenbach, L. Fang, M. A. Olson, D. C. Friedman, S. Basu, S. K. Dey, Y. Y. Botros, J. F. Stoddart
Solvent-dependent ground-state distributions in a donor-acceptor redox-active bistable [2]catenane
J. Phys. Org. Chem. **25**, 544–552 (2012).
7. R. S. Forgan, C. Wang, D. C. Friedman, J. M. Spruell, C. L. Stern, A. A. Sarjeant, **D. Cao**, J. F. Stoddart
Donor-acceptor ring-in-ring complexes
Chem. Eur. J. **18**, 202–212 (2012).

From Undergraduate Research at Lawrence National Laboratory

6. D. Hanifi, **D. Cao**, L. M. Klivansky, Y. Liu
Novel C₃-symmetric n-type discotic tris(aryleneimidazole) and its analogs: Synthesis, physical properties and self-assembly
Chem. Commun. **47**, 3453–3456 (2011).
5. G. Koshkaryan, P. Jiang, V. Altoe, **D. Cao**, L. M. Klivansky, Y. Zhang, S.-W. Chung, A. Katan, F. Martin, M. Salmeron, J. De Yoreo, B. Ma, S. Aloni, Y. Liu
Multilayered nanofibers from stacks of single-molecular thick nanosheets of hexakis(alkoxy)triphenylenes
Chem Commun. **46**, 8579–8581 (2010).
4. **D. Cao**, Amelia, M.; L. M. Klivansky, G. Koshkaryan, S. I. Khan, M. Semeraro, S. Silvi, M. Venturi, A. Credi,

Y. Liu

Probing donor-acceptor interactions and co-conformational changes in redox switchable desymmetrized [2]catenanes

J. Am. Chem. Soc. **132**, 1110–1122 (2010).

3. G. Koshkaryana, **D. Cao**, L. M. Klivansky, S. J. Teat, J. L. Tran, Y. Liu
Dual selectivity expressed in [2+2+1] dynamic clipping of desymmetrized [2]catenanes
Org. Lett. **12**, 1528–1531 (2010).
2. L. M. Klivansky, G. Koshkaryana, **D. Cao**, Y. Liu
Linear π -acceptor-templated dynamic clipping to macrobicycles and [2]rotaxanes
Angew. Chem. Int. Ed. **48**, 4185–4189 (2009).
1. G. Koshkaryana, L. M. Klivansky, **D. Cao**, M. Snauko, S. J. Teat, J. O. Struppe, Y. Liu
Alternative donor-acceptor stacks from crown ethers and naphthalene diimide derivatives: Rapid, selective formation from solution and solid state grinding,
J. Am. Chem. Soc. **131**, 2078–2079 (2009).

Invited Talks

11/13/2015	Carleton College	Northfield, MN
11/19/2014	Macalester College	Saint Paul, MN
11/14/2014	San Jose State University	San Jose, CA
11/11/2014	Fisk University	Nashville, TN
10/06/2014	Trinity University	San Antonio, TX
12/18/2013	University of Glasgow	Glasgow, UK
10/29/2012	National Institute of Biological Sciences	Beijing, China
10/19/2012	Wuhan University	Wuhan, China
10/11/2012	Jilin University	Changchun, China

Poster Presentations

08/11/2014	AEI Poster Session	San Francisco, CA
05/03/2014	Gordon Research Conference and Seminar	Barga, Italy
12/16/2013	MASC-2013	Glasgow, UK
09/09/2013	ACS Indianapolis	Indianapolis, IN
07/07/2013	ISMSC-8	Arlington, VA
05/26/2012	CCIS Symposium	Evanston, IL
05/09/2011	FENA Annual Review	Cambridge, MA
04/12/2011	FNANO 2011	Snowbird, UT
04/25/2010	Berkeley Nano Forum	Berkeley, CA
04/23/2010	Berkeley Undergraduate Research Fair	Berkeley, CA

Lecture Courses Taught

2016 Spring	Chem 212 Organic Chemistry 2	Macalester College
2015 Fall	Chem 211 Organic Chemistry 1	Macalester College
2014 Summer	Chemistry II General Chemistry	Northwestern University

Professional Societies

American Chemical Society (ACS)

Phi Lambda Upsilon (PLU)

Council of Undergraduate Research (CUR)