MARK A. OLSON, PhD

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EDUCATION

PhD Chemistry – August 2010 **Northwestern University (NU)**, Evanston, IL
Thesis: The Materials Chemistry of the Mechanical Bond and its Supramolecular Precursors: Their Formation under Kinetic and Thermodynamic Control

Began graduate career at UCLA followed by a group move to NU

BSC Chemistry – May 2005 **Texas A&M University,** Corpus Christi, TX

PROFESSIONAL EXPERIENCE

Northwestern University
Graduate Research Assistant, 2007–2010 Evanston, IL

- PhD Advisor: Professor J Fraser Stoddart
- Designed both a thermodynamic and a kinetic route to switchable side-chain polycatenanes
- Developed reconfigurable metal-nanoparticle assemblies based on noncovalent interactions
- Incorporated molecular and supramolecular switches onto the surfaces of metal-nanoparticles
- Established an approach to predicting equilibrium thermodynamics of molecular switches
- Identified both translational isomers of a bistable [2]catenane in the solid-state
- Elucidated competing charge-transfer interactions in a chemical system upon crystallization
- Observed both positive and negative electrostatic cooperativity in charged chemical systems
- Mastered the art of growing single crystals suitable for X-ray crystallographic analysis

University of California at Los Angeles (UCLA) / California Nanosystems Institute (CNSI)
Graduate Research Assistant, 2005–2007 Los Angeles, CA

- PhD Advisor: Professor J Fraser Stoddart
- Organic synthesis / purification of mechanically interlocked molecular switches (MIMS)
- Investigated the application of the azide-alkyne Huisgen cycloaddition towards MIMS
- Design / characterization of organic nano-structured materials / polymers for device applications

University of California at Los Angeles (UCLA)
Teaching Assistant, 2005–2007 Los Angeles, CA

- Supervised / Taught undergraduate organic chemistry I and II laboratory
- Supervised / Taught undergraduate biochemistry I laboratory
- Wrote quizzes, exam questions, developed lesson plans

Texas A&M University
Undergraduate Research Assistant, 2003–2005 Corpus Christi, TX

- Advisors: Professors Eugene and Fereshteh Billiot
- Use of steady-state fluorescence spectroscopy to characterize novel amino acid-based surfactants
- Monitored interactions of known endocrine disrupters with Human Chorionic Gonadotropin
- Elucidation of compounds with antibacterial properties from plants native to south Texas

California Institute of Technology (CALTECH)
Undergraduate Research Assistant, June–September 2004 Pasadena, CA

- Advisor: Professor Jack L Beauchamp
- Developed fluorescent chemical sensors for the gas phase determination of enantiomeric excess
- Synthesized novel solvatochromic fluorescent probes

SAMM (Service Assembly Maintenance and More)
Electrical/Mechanical Technician, 2002–2003 Corpus Christi, TX

- Designed / Manufactured charged couple devices (CCDs) for intra-oral applications
- Repaired / Maintained / reverse engineered intra-oral dental cameras and imaging devices

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AWARDS & ACTIVITIES

Howard Hughes Institute Research Fellow (2004)
Welch Research Fellow (2003–2004)
NSF Louis Stokes Alliances for Minority Participation Program Fellow (2003)
Citgo Refining Math/Science Challenge scholarship recipient (2000–2004)
University Honors scholarship recipient (2000–2004)
American Chemical Society member (2007–Present)
Sigma Xi Associate member (2004–Present)
President and vice-president of the Texas A&M Chemistry Club (2003–2005)

PUBLICATIONS

1. **Olson, M. A.**; Wang, C.; Fang, L.; Benítez, D.; Tkatchouk, E.; Basu, S.; Basuray, A. N.; Zhang, D.; Zhu, D.; Goddard, W. A.; Stoddart, J. F. "The Dynamic Stereochemistry of a Bistable Donor-Acceptor [2]Catenane" *Proc. Natl. Acad. Sci. USA* **2010**, doi/10.1073/pnas.1009302107.

2. Spruell, J. M.; Coskun, A.; Friedman, D. C.; Forgan, R. S.; Sarjeant, A. A.; Trabolsi, A.; Fahrenbach, A. C.; Barin, G.; Paxton, W. F.; Dey, S. K.; **Olson, M. A.**; Benítez, D.; Tkatchouk, E.; Colvin, M. T.; Carmielli, R.; Caldwell, S. T.; Rosair, G. M.; Hewage, S. G.; Duclairoir, F.; Seymour, J. L.; Slawin, A. M. Z.; Goddard, W. A.; Wasielewski, M. R.; Cooke, G.; Stoddart, J. F. "Highly Stable Tetrathiafulvalene Radical Dimers in [3]Catenanes" *Nature Chem.* **2010**, doi: 10.1038/nchem.749.

3. **Olson, M. A.**; Botros, Y. Y.; Stoddart, J. F. "Mechanostereochemistry" *Pure Appl. Chem*. **2010**, *82*, 1569–1574.

4. Deng, H.; **Olson, M. A.**; Stoddart, J. F.; Yaghi, O. M. "The Concept of Robust Dynamics" *Nature Chem.* **2010**, *2*, 439–443.

5. **Olson, M. A.**; Coskun, A.; Fang, L.; Basuray, A.; Stoddart, J. F. "Polycatenation Under Thermodynamic Control" *Angew. Chem. Int. Ed*. **2010**, *49*, 3151–3156.

6. Coskun, A.; Klajn, R.; Trabolsi, A.; Fang, L.; **Olson, M. A.**; Wesson, P. J.; Dey, D. K.; Grzybowski, B. A.; Stoddart, J. F. "Molecular-Mechanical Switching at the Metal Nanoparticle-Solvent Interface: Practice and Theory" *J. Am. Chem. Soc.* **2010**, *132*, 4310–4320.

7. Fang, L.; **Olson, M. A.**; Stoddart, J. F. "Mechanically Bonded Macromolecules" *Chem. Soc. Rev.* **2010**, 39, 17–29. **Selected for Journal Cover.**

8. **Olson, M. A.**; Braunschweig, A. B.; Fang, L.; Ikeda, T.; Klajn, R.; Trabolsi, A.; Mirkin, C.; Wesson, P.; Benitez, D.; Grzybowski, B. A.; Stoddart, J. F. "A Bistable Poly[2]catenane Forms Nanosuperstructures" *Angew. Chem. Int. Ed.* **2009**, *48*, 1792–1797.

9. **Olson, M. A.**; Coskun, A.; Klajn, R.; Fang, L.; Dey, S. K.; Browne, K.; Grzybowski, B. A.; Stoddart, J. F. "Assembly of Polygonal Nanoparticle Clusters Directed By Reversible Noncovalent Bonding Interactions" *Nano Lett.* **2009**, *9*, 3185–3190.

10. **Olson, M. A.**; Braunschweig, A.; Ikeda, T.; Fang, L.; Trabolsi, A.; Slawin, A. M. Z.; Stoddart, J. F. "Thermodynamic Forecasting of Mechanically Interlocked Switches" *Org. Biomol. Chem.* **2009**, ***7***, 4391–4405. **Highlighted as HOT ARTICLE: OBC website. Selected for Journal Cover.**

11. Klajn, R.; **Olson, M. A.**; Fang, L.; Coskun, A.; Wesson, P. J.; Trabolsi, A.; Stoddart, J. F.; Grzybowski, B. A. "On-demand Capture and Release of Metal Nanoparticles Using a Functional Polymer" *Nature Chem.* **2009**, 1, 733–738.

12. Fang, L.; Hmadeh, M.; Wu, J.; **Olson, M. A.**; Spruell, J. M.; Trabolsi, A.; Yang, Y.-W.; Elhabiri, M.; Albrecht-Gary, A.-M.; Stoddart, J. F. "Acid-Based Actuation of [c2] Daisy Chains" *J. Am. Chem. Soc.* **2009**, *131*, 7126–7134.

13. Klajn, R.; Fang, L.; Coskun, A.; **Olson, M. A.**; Grzybowski, B. A.; Stoddart, J. F. "Metal Nanoparticles Functionalized with Molecular and Supramolecular Switches" *J. Am. Chem. Soc.* **2009**, *131*, 4233–4235.

14. Braunschweig, A. B.; Dichtel, W. R.; Miljanić, O. Š.; **Olson, M. A.**; Spruell, J. M.; Khan, S. I.; Heath, J. R.; Stoddart, J. F. "Modular Synthesis and Dynamics of a Variety of Donor-Acceptor Interlocked Compounds Prepared by a Click Chemistry Approach" *Chem. Asian J.* **2007**, *2*, 634–647.

SELECTED PRESENTATIONS

1. Olson, M A.; Klajn, R.; Fang, L.; Coskun, A.; Grzybowski, B. A.; Stoddart, J. F. "Dynamic Hook-and-Eye Nanoparticulate Templation." **International Symposium on Macrocyclic & Supramolecular Chemistry (ISMSC), Maastricht, Netherlands**, June 2009.

2. Olson, M. A.; Benitez, D.; Braunschweig, A. B.; Ikeda, T.; Stoddart, J. F. "Bistable side-chain poly[2]catnanes: A mechanically switchable polymer." **236th ACS National Meeting, Philadelphia, Pennsylvania**, August 2008.

3. Olson, M. A.; Benitez, D.; Braunschweig, A. B.; Ikeda, T.; Stoddart, J. F. "Bistable side-chain poly-[2]catnanes: A mechanically switchable polymer." **Opportunities for Nanostructured Polymeric Materials for Device Fabrication: ACS Polymer Division, Lake Tahoe, Nevada**, November 2007.

4. Olson, M. A.; Kang, S.; Mendes, P.; Braunschweig, A.; Aprahamian, I.; Saha, S.; Leung, K.; Stoddart, J. F. "Self-assembly of Quantum Dot Architectures: Towards Molecular Spin Transfer Channels." **Center for Nanoscience Innovation for Defense PI Meeting, Santa Monica, California**, June 2006.

5. Olson, M. A.; Hodyss, R.; Beauchamp, J. "Discrimination of Enantiomeric Forms of Amino Alcohols using Fiber Optic Fluorescence Spectroscopy." **California Institute of Technology SURF seminar day. Pasadena, California**, August 2004.

6. Olson, M. A.; Faybeshev, M.; Billiot, E. "Characterization and Comparison of the Physical Properties of a Novel Class of Branched Amino-Acid Based Surfactants Versus Their Linear Counterparts." **Council on Undergraduate Research (CUR) Posters on the Hill Conference. Washington DC**, April 2004.

REFERENCES

Sir Fraser Stoddart
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