

Julian Chan, Ph.D.

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EDUCATION

Massachusetts Institute of Technology Sep 2005 - Jun 2010
Ph.D., Organic Chemistry
GPA 5.0/5.0
Thesis: "Design and Synthesis of Conjugated Macrocycles and Polymers"

University of Illinois at Urbana-Champaign Aug 2001 - May 2005
B.S., Chemistry (*summa cum laude*)
GPA 4.0/4.0

EXPERIENCE

IBM Almaden Research Center Aug 2012 - present
Research Scientist, Advanced Organic Materials Group

- Designed and synthesized soft materials for nanomedicine applications
- Developed new molecular designs for organic nanoparticle self-assembly
- Devised novel strategies for polycarbonate and polyurethane synthesis
- Authored 11 peer-reviewed publications and 5 patent applications

UC Berkeley / Lawrence Berkeley National Lab Aug 2010 - Aug 2012
Postdoctoral Fellow, Adviser: Prof. F. Dean Toste

- Designed a catalytic degradation of lignin biopolymers for renewable fuels
- Developed efficient metal-catalyzed syntheses of aromatic heterocycles
- Led interdisciplinary collaborations within the Energy Biosciences Institute

Massachusetts Institute of Technology Dec 2005 - June 2010
Graduate Research Assistant, Adviser: Prof. Timothy Swager

- Designed and synthesized π -conjugated organic optoelectronic materials
- Rationally designed efficient light-harvesting π -conjugated macrocycles
- Synthesized conjugated polymers with tunable photophysical properties
- Developed wide bandgap π -conjugated cyclic oligo-*m*-phenylenes
- Collaborated effectively with physicists and materials scientists

University of Illinois at Urbana-Champaign May 2002 - May 2005
Undergraduate Research Assistant, Adviser: Prof. Eric Oldfield

- Synthesized a large library of bisphosphonates for antimicrobial studies
- Prepared computationally-designed molecules for T-cell stimulation

PUBLICATIONS

1. Ong, Z. Y.; Coady, D. J.; Tan, J. P. K.; Li, Y.; **Chan, J. M. W.**; Hedrick, J. L.; Yang, Y. Y. "Design and Synthesis of Biodegradable Grafted Cationic Polycarbonates as Broad Spectrum Antimicrobial Agents", *Submitted to Macromol. Rapid Commun.*
2. Xu, Q.; Sardon, H.; **Chan, J. M. W.**; Hedrick, J. L.; Yang, Y. Y. "Polyurethane-coated Silica Particles with Broad-Spectrum Antibacterial Properties", *Polym. Chem.* **2015**, Accepted manuscript. DOI: 10.1039/c4py01455c.
3. **Chan, J. M. W.***; Zhang, X.; Sardon, H.; Engler, A. C.; Fox, C. H.; Frank, C. W.; Waymouth, R. M.; Hedrick, J. L. "Organocatalytic Ring-Opening Polymerization of Trimethylene Carbonate to Yield a Biodegradable Polycarbonate", *J. Chem. Educ.* **2014**, ASAP article. DOI: 10.1021/ed500595k.
4. Ng, V. W. L.; **Chan, J. M. W.**; Sardon, H.; Ono, R. J.; García, J. M.; Yang, Y. Y.; Hedrick, J. L. "Antimicrobial Hydrogels: A New Weapon in the Arsenal against Multidrug Resistant Infections", *Adv. Drug Deliv. Rev.* **2014**, 78, 46-62.
5. Ke, X.; Ng, V. W. L.; Ono, R. J.; **Chan, J. M. W.**; Krishnamurthy, S.; Wang, Y.; Hedrick, J. L.; Yang, Y. Y. "Role of non-covalent and covalent interactions in cargo loading capacity and stability of polymeric micelles", *J. Control. Release* **2014**, 193, 9-26.
6. Liu, S. Q.; Venkataraman, S.; Ong, Z. Y.; **Chan, J. M. W.**; Yang, C.; Hedrick, J. L.; Yang, Y. Y. "Overcoming Multidrug Resistance in Microbials Using Nanostructures Self-assembled from Cationic Bent-core Oligomers", *Small* **2014**, 10, 4130-4135.
7. **Chan, J. M. W.***; Ke, X.; Engler, A. C.; Sardon, H.; Yang, Y. Y.; Hedrick, J. L. "Chemically Modifiable *N*-Heterocycle-functionalized Polycarbonates as a Platform for Diverse Smart Biomimetic Nanomaterials", *Chem. Sci.* **2014**, 5, 3294-3300. "**Most downloaded articles**" list of July 2014.
8. Sardon, H.; **Chan, J. M. W.**; Ono, R. J.; Mecerreyes, D.; Hedrick, J. L. "Highly Tunable Polyurethanes: Organocatalyzed Polyaddition and Subsequent Post-polymerization Modification of Pentafluorophenyl Ester Sidechains", *Polym. Chem.* **2014**, 5, 3547-3550.
9. Sardon, H.; Engler, A. C.; **Chan, J. M. W.**; García, J. M.; Coady, D. J.; Pascual, A.; Mecerreyes, D.; Jones, G. O.; Rice, J. E.; Horn, H. W.; Hedrick, J. L. "Organic Acid-Catalyzed Polyurethane Formation via a Dual-Activated Mechanism: Unexpected Preference of *N*-activation over *O*-activation of Isocyanates", *J. Am. Chem. Soc.* **2013**, 135, 16235-16241.
10. **Chan, J. M. W.***; Sardon, H.; Engler, A. C.; García, J. M.; Hedrick, J. L. "Tetra-*n*-butylammonium Fluoride as an Efficient Transesterification Catalyst for Functionalizing Cyclic Carbonates and Aliphatic Polycarbonates", *ACS Macro Lett.* **2013**, 2, 860-864. **Top 20 most read article of the month.**

* denotes corresponding author

11. Engler, A. C.; **Chan, J. M. W.**; Fukushima, K.; Coady, D. J.; Yang, Y. Y.; Hedrick, J. L. "Polycarbonate-based Brush Polymers with Detachable Disulfide-linked Side Chains", *ACS Macro Lett.* **2013**, *2*, 332-336.
12. Sardon, H.; Engler, A. C.; **Chan, J. M. W.**; Coady, D. J.; O'Brien, J. M.; Mecerreyes, D.; Yang, Y. Y.; Hedrick, J. L. "Homogeneous Isocyanate- and Catalyst-free Synthesis of Polyurethanes in Aqueous Media", *Green Chem.* **2013**, *15*, 1121-1126.
13. Engler, A. C.; **Chan, J. M. W.**; Coady, D. J.; O'Brien, J. M.; Sardon, H.; Nelson, A.; Sanders, D. P.; Yang, Y. Y.; Hedrick, J. L. "Accessing New Materials Through Polymerization and Modification of a Polycarbonate with a Pendant Activated Ester", *Macromolecules* **2013**, *46*, 1283-1290.
14. **Chan, J. M. W.**; Bauer, S.; Sorek, H.; Sreekumar, S.; Wang, K.; Toste, F. D. "Studies on the Vanadium-Catalyzed Nonoxidative Depolymerization of *Miscanthus giganteus*-derived Lignin", *ACS Catal.* **2013**, *3*, 1369-1377.
15. **Chan, J. M. W.**; Amarante, G. W.; Toste, F. D. "Tandem Cycloisomerization/Suzuki Coupling of Arylethynyl MIDA Boronates", *Tetrahedron* **2011**, *67*, 4306-4312. **Front cover article. Method referenced on sigmaaldrich.com**
16. **Chan, J. M. W.**; Kooi, S. E.; Swager, T. M. "Synthesis of Stair-stepped Polymers Containing Dibenz[*a,h*]anthracene Subunits", *Macromolecules* **2010**, *43*, 2789-2793.
17. **Chan, J. M. W.**; Tischler, J. R.; Kooi, S. E.; Bulović, V.; Swager, T. M. "Synthesis of J-Aggregating Dibenz[*a,j*]anthracene-Based Macrocycles", *J. Am. Chem. Soc.* **2009**, *131*, 5659-5666.
18. **Chan, J. M. W.**; Swager, T. M.; "Synthesis of Arylethynylated Cyclohexa-*m*-phenylenes via Sixfold Suzuki Coupling", *Tetrahedron Lett.* **2008**, *49*, 4912-4914.
19. Song, Y.; **Chan, J. M. W.**; Tovian, Z.; Secrest, A.; Nagy, E.; Krysiak, K.; Bergan, K.; Parniak, M. A.; Oldfield, E. "Bisphosphonate Inhibitors of ATP-mediated HIV-1 Reverse Transcriptase Catalyzed Excision of Chain-terminating 3'-azido, 3'-deoxythymidine: A QSAR Investigation", *Bioorg. Med. Chem.* **2008**, *16*, 8959-8967.
20. Hudock, M. P.; Sanz-Rodriguez, C. E.; Song, Y.; **Chan, J. M. W.**; Zhang, Y.; Odeh, S.; Kosztowski, T.; Leon-Rossell, A.; Concepcion, J. L.; Yardley, V.; Croft, S. L.; Urbina, J. A.; Oldfield, E. "Inhibition of Trypanosoma cruzi Hexokinase by Bisphosphonates", *J. Med. Chem.* **2006**, *49*, 215-223.
21. Kotsikorou, E.; Song, Y.; **Chan, J. M. W.**; Faelens, S.; Tovian, Z.; Broderick, E.; Bakalara, N.; Docampo, R.; Oldfield, E. "Bisphosphonate Inhibition of the Exopolyphosphatase Activity of the Trypanosoma brucei Soluble Vacuolar Pyrophosphatase", *J. Med. Chem.* **2005**, *48*, 6128-6139.
22. Sanders, J. M.; Song, Y.; **Chan, J. M. W.**; Jennings, S.; Kosztowski, T.; Odeh, S.; Flessner, R.; Kotsikorou, E.; Meints, G.; Gomez, A. O.; Gonzalez-Pacanowska, D.; Raker, A. M.; Wang, H.; Morita, C. T.; Oldfield, E. "Pyridinium-1-yl Bisphosphonates are Potent Inhibitors of Farnesyl Diphosphate Synthase", *J. Med. Chem.* **2005**, *48*, 2957-2963.

23. Ling, Y.; Sahota, G.; Odeh, S.; **Chan, J. M. W.**; Araujo, F. G.; Moreno, S. N. J.; Silvia, N. J.; Oldfield, E. "Bisphosphonate Inhibitors of Toxoplasma gondi Growth: In Vitro, QSAR and In Vivo Investigations", *J. Med. Chem.* **2005**, *48*, 3130-3140.
24. Sanders, J. M.; Ghosh, S.; **Chan, J. M. W.**; Meints, G. A.; Wang, H.; Raker, A. M.; Song, Y.; Colantino, A.; Burzynska, A.; Kafarski, P.; Morita, C. T.; Oldfield, E. "Quantitative Structure-Activity Relationships for γ,δ T-Cell Activation by Bisphosphonates", *J. Med. Chem.* **2004**, *47*, 375-384.
25. Ghosh, S.; **Chan, J. M. W.**; Lea, C. R.; Meints, G. A.; Lewis, J. C.; Tovian, Z. S.; Flessner, R. M.; Loftus, T. C.; Bruchhaus, I.; Kendrick, H.; Croft, S. L.; Kemp, R. G.; Kobayashi, S.; Nozaki, T.; Oldfield, E. "Effects of Bisphosphonates on the Growth of Entamoeba histolytica and Plasmodium Species in vitro and in vivo", *J. Med. Chem.* **2004**, *47*, 175-187. *Cited in PNAS 2013 and Nature Medicine 2012*

PATENTS / PATENT APPLICATIONS

1. **Chan, J. M. W.**; Wojtecki, R.; Hedrick, J. L.; Yang, Y. Y.; Lee, A. L. Z. "Biodegradable Organic Radical-Functionalized Diblock Copolymers as Theranostic Agents", Patent disclosure, **2015**.
2. Lin, B. F.; **Chan, J. M. W.**; Nelson, A.; Engler, A. C.; Hedrick, J. L.; Maune, H. "Irreversibly Degradable Polycarbonate-based Complex Coacervate", Patent disclosure, **2014**.
3. **Chan, J. M. W.**; Engler, A. C.; Sardon, H.; Hedrick, J. L.; Yang, Y. Y. "Polycarbonates Bearing Aromatic *N*-Heterocycles for Drug Delivery", U.S. Patent App. 14/097488, **2013**.
4. Sardon, H.; Hedrick, J. L.; Coady, D. J.; **Chan, J. M. W.**; Engler, A. C.; O'Brien, J. M.; Jones, G. O.; Horn, H. W.; Rice, J. E. "Organic Acids as Efficient Catalysts for Polyurethane Synthesis", Patent disclosure, **2013**.
5. Hedrick, J. L.; Sardon, H.; O'Brien, J. M.; Coady, D. J.; Engler, A. C.; **Chan, J. M. W.** "Isocyanate-free Polyurethane Production Process via Carbonate Polyesterification in Aqueous Media", Patent disclosure, **2013**.
6. Sanders, J. M.; Song, Y.; **Chan, J. M. W.**; Oldfield, E.; Zhang, Y. "Bisphosphonate compounds and methods for bone resorption diseases, cancer, bone pain, immune disorders and infectious diseases", U.S. Patent 8,071,573, **2011**.
7. Parniak, M.; Mellors, J. W.; Oldfield, E.; Tovian, Z.; **Chan, J. M. W.** "Composition and Methods for Use of Antiviral Drugs in the Treatment of Retroviral Diseases Resistant to Nucleoside Reverse Transcriptase Inhibitors", U.S. Patent App. 10/927683, **2005**.

AWARDS / HONORS / FELLOWSHIPS

IBM Invention Achievement Award	2013
Thieme Chemistry SYNStar Award	2006
MIT-DuPont Presidential Fellowship	2005-2006
UIUC Departmental Highest Distinction	2005
UIUC James Scholar	2005
Bronze Tablet Award	2005
Robert H. Doremus Scholarship	2004
Jean Dreyfus Boissevain Research Award	2004
Arthur R. Matheson Award	2004
Worth Rodebush Award	2003
Hach Scientific Foundation Scholarship (twice)	2003, 2004
Ralph E. Telford Achievement Award	2002-2005
University of Illinois Dean's List	2002-2005
Golden Key International Honor Society	2002-2005
National Society of Collegiate Scholars	2002-2005
Phi Beta Kappa Society	2002-2005
Dads Association Library Award	2002
The National Dean's List	2001-2005
Colgate-Palmolive Research Fellowship	2001
Pittsburgh Plate Glass Research Grant	2001
9 th Singapore Chemistry Olympiad Silver Medal	1997

TEACHING / MENTORSHIP EXPERIENCE

- **2013:** Research mentor to foreign intern (Roy Lubbers, University of Twente, Netherlands, Masters student)
- **2013:** Research mentor to an IBM intern (Courtney Fox, Stanford ChemE, Ph.D. candidate)
- **2013:** Designed a 3-hour undergraduate polymer chemistry laboratory experiment, which has been incorporated into the pilot lab course CHEM 35L at Stanford University for Summer and Fall 2014.
- **2012:** Problem set group meetings: (a) Compose problems for Toste group 1st-year graduate students, (b) Deliver topical lectures, (c) Host problem-solving session on the board.
- **2011:** Mentored a summer undergrad intern in the Toste group at UC Berkeley (Mark Levin, University of Rochester).
- **2003-2005:** Mentored new undergraduate researchers in the Oldfield group at UIUC (Thomas Kosztowski, Erin Broderick, Christine Schwerdtfeger, Alison Colantino, Katie Siegel, Terry Lu)
- **2003:** Private tutor for Introductory Organic Chemistry I (Student: Terry Lu)

CONFERENCES / INVITED TALKS

1. **Chan, J. M. W.** "Design and Synthesis of Organic Materials: From Conjugated Macrocycles to Functional Polycarbonates", National University of Singapore, **2014**.
2. **Chan, J. M. W.**; Sardon, H.; Engler, A. C.; Hedrick, J. L. "Organocatalytic methods and postpolymerization modification strategies for functional aliphatic polycarbonate synthesis", 247th ACS National Meeting & Exposition, Dallas, TX, **2014**.
3. **Chan, J. M. W.** "Design and Synthesis of Organic Materials: From Conjugated Macrocycles to Functional Polycarbonates", University of California, Riverside, **2014**.
4. **Chan, J. M. W.** "Design and Synthesis of Organic Materials: From Conjugated Macrocycles to Functional Polycarbonates", Carnegie Mellon University, **2014**.
5. **Chan, J. M. W.** "Making and Breaking Macromolecules: From Electronic Materials to Biomass", University talk, ARC, San Jose, CA, **2012**.
6. **Chan, J. M. W.**; Swager, T. M. "Synthesis of Dibenz[*a,j*]anthracene-based J-aggregates", MIT Research Symposium in Organic and Bioorganic Chemistry, Cambridge, MA, **2009**.
7. **Chan, J. M. W.**; Swager, T. M. "Synthesis of Functionalized Hexa-*m*-phenylenes", 234th ACS National Meeting, Boston, MA, **2007**.
8. **Chan, J. M. W.**; Swager, T. M. "Synthesis of Novel Kekulene-type Torands", 21st International Liquid Crystal Conference, Keystone, CO, **2006**.
9. **Chan, J. M. W.**; Oldfield, E. "Design and Synthesis of Pharmaceutical Bisphosphonates", Colgate-Palmolive Symposium, Urbana, IL, **2002**.

OTHER PROFESSIONAL ACTIVITIES

- Co-editor/contributor for SYNFACTS, Thieme Publishers (**2006-2007**)
- Reviewed manuscripts for Journal of Organic Chemistry and Macromolecules (**2007-2010**)
- Independent reviewer for Beilstein Journal of Organic Chemistry (**2013-present**)
- Independent reviewer for Polymer Chemistry (**2013-present**)
- Independent reviewer for ACS Macro Letters (**2014-present**)

PROFESSIONAL MEMBERSHIPS

- American Chemical Society (ACS)
- International Union of Pure and Applied Chemistry (IUPAC)

LANGUAGES

- English - 1st language, native proficiency
- Mandarin - 2nd language, intermediate proficiency
- French - Certificat Élémentaire I - Mention excellent (Oct 1999)
- Certificat Élémentaire II - Mention très bien (Jun 2000)
(certified by Alliance Française de Singapour)

REFERENCES

Prof. Timothy M. Swager

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Prof. Eric Oldfield

Harriet Harlin Professor of Chemistry
University of Illinois at Urbana-Champaign
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Prof. F. Dean Toste

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Prof. Gregory C. Fu

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