

Curriculum Vitae

Name Jin-Quan Yu

Marital status Married

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Academic record

- 7.2007- Associate Professor, Department of Chemistry, The Scripps Research Institute
- 3.2004-6.2006 Assistant Professor, Department of Chemistry, Brandeis University
- 10.2003-2.2004 Royal Society Research Fellow, University of Cambridge, UK
- 2.2001-5.2002 Postdoctoral Fellow, Department of Chemistry and Chemical Biology, Harvard University. Supervisor: Professor E. J. Corey
- 10.1999-10.2003 Junior Research Fellow (JRF) of St John's College, University of Cambridge
- 10.1994-9.1999 Department of Chemistry, University of Cambridge, Christ's College, Ph.D. in Chemistry
- Thesis: Mechanistic investigation into catalytic hydrogenation
- Supervisor: Dr J. B. Spencer
- Examined by Dr J. M. Brown (FRS, University of Oxford) and Professor A. B. Holmes (FRS, University of Cambridge) on June 19 2000
- 10.1990-9.1994 Guangzhou Institute of Chemistry, Chinese Academy of Sciences, Teaching and Research Assistant in Organic Chemistry
- 9.1988-7.1990 Guangzhou Institute of Chemistry, Chinese Academy of Sciences, MSc research
- Thesis: Shape-selective hydroxylation and alkoxylation of mono terpenes catalyzed by H-mordenite
- Supervisor: Professor S. D. Xiao
- 9.1987-7.1988 Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences, MSc course
- 9.1982-7.1987 Undergraduate study, Department of Chemistry, East China Normal University, Shanghai, China (BSc). National exams for postgraduate admission to Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences, top 5% among candidates from all universities
- Thesis: Asymmetric hydrogenation of 2-(6-methoxy-2-naphthyl)acrylic acid using aminoacid modified palladium catalyst
- Supervisor: Professor L. X. Dai (Member of Chinese Academy of Sciences, Shanghai Institute of Organic Chemistry)

Teaching experience

Organic Experiments, Brandeis University

Organometallic Chemistry in Synthesis, Brandeis University

Advanced Organic Chemistry: Bonding, Structure and Reaction Mechanism, Brandeis University

Project supervisor for Part III Organic Chemistry, Cambridge University

Chief Demonstrator for Part I and II Organic Chemistry, Cambridge University

Natural Science Supervisor for Undergraduates in St John's College, Cambridge University

Publications

Postgraduate and postdoctoral studies:

1. "Selective reaction of camphene with phenols catalyzed by mordenite" Liu, B.; Yu, J. Q.; Xiao, S. *J. Org. Chem. (Chinese)* **1995**, *15*, 318.
2. "Stereoselective deoxygenation of *myo*-inositol monotosylates with lithium triethylborohydride" Yu, J. Q.; Spencer, J. B. *J. Org. Chem.* **1996**, *61*, 3234.
3. "First evidence that the mechanism of catalytic hydrogenation with homogeneous palladium and rhodium catalysts is strongly influenced by substrate polarity" Yu, J. Q.; Spencer, J. B. *J. Am. Chem. Soc.* **1997**, *119*, 5257.
4. "Regioselective hydrometalation of alkenes reveals the amphipolar nature of the Pd-H bond in heterogeneous hydrogenation" Yu, J. Q.; Spencer, J. B. *J. Org. Chem.* **1997**, *63*, 4172.
5. "Discovery that quinoline and triphenylphosphine alter the electronic properties of hydrogenation catalysts" Yu, J. Q.; Spencer, J. B. *Chem. Commun.* **1998**, 1103.
6. "Rational design of benzyl protecting groups allows sequential deprotection of hydroxyl groups by catalytic hydrogenolysis" Gaunt, M. J.; Yu, J. Q.; Spencer, J. B. *J. Org. Chem.* **1998**, *63*, 4172.
7. "Heterogeneous transfer hydrogenation involves pairwise hydrogen transfer from the same position of two molecules of formic acid" Yu, J. Q.; Spencer, J. B. *Chem. Commun.* **1998**, 1935.
8. "New insight into the mechanism of catalytic hydrogenation allows the key intermediate in asymmetric hydrogenation to be predicted" Yu, J. Q.; Spencer, J. B. *Tetrahedron* **1998**, *54*, 15821.
9. "Preferential hydrogenolysis of NAP esters provides a new orthogonal protecting group strategy for carboxylic acids" Gaunt M. J.; Boschetti C. E.; Yu, J. Q.; Spencer, J. B. *Tetrahedron Lett.* **1999**, *40*, 1803.
10. "Direct comparison between homogeneous and heterogeneous hydrogenation" Yu, J. Q.; Whitney, P-S.; Spencer, J. B. *J. Mol. Catal. A-Chem.* **1999**, *146*, 199.
11. "Evidence for direct hydride delivery from formic acid in transfer hydrogenation" Yu, J. Q.; Spencer, J. B. *Chem. Eur. J.* **1999**, *5*, 2237.
12. "Selective hydrogenolysis of novel benzyl carbamate protecting groups" Papageorgiou E. A.; Gaunt, M. J.; Yu, J. Q.; Spencer, J. B. *Org. Lett.* **2000**, *2*, 1049.
13. "Sequential removal of the benzyl-type protecting groups PMB and NAP by oxidative cleavage using CAN and DDQ" Wright, J. A.; Yu, J. Q.; Spencer, J. B. *Tetrahedron Lett.* **2001**, *42*, 4033.

14. "Convenient syntheses of 2-*deoxy-scylo*-inosose and 2-*deoxy-scylo*-inosamine: two key intermediates on the biosynthetic pathway to aminoglycoside antibiotics" Yu, J. Q.; Spencer, J. B. *Tetrahedron Lett.* **2001**, 42, 4219.
15. "Evidence that availability of allylic hydrogen governs the regioselectivity of Wacker oxidation" Gaunt, M. J.; Yu, J. Q.; Spencer, J. B. *Chem. Commun.* **2001**, 1844.
16. "Convenient preparation of *trans*-arylalkenes via palladium(II)-catalyzed summarization of *cis*-arylalkenes" Yu, J. Q.; Gaunt, M. J.; Spencer, J. B. *J. Org. Chem.* **2002**, 67, 4627.
17. "Diverse pathways for the palladium(II)-mediated oxidation of olefins by *tert*-butylhydroperoxide" Yu, J. Q.; Corey, E. J. *Org. Lett.* **2002**, 4, 2727.
18. "Biosynthesis of aminoglycoside antibiotics: cloning, expression and characterization of an aminotransferase involved in the pathway to 2-deoxystreptamine" Huang, F. L.; Li, Y. Y.; Yu, J. Q.; Spencer, J. B. *Chem. Commun.* **2002**, 2860.
19. "A general, polymer-supported acid catalyzed hetero-Michael addition" Wabnitz, T. C.; Yu, J. Q.; Spencer, J. B. *Synlett* **2003**, 1070.
20. "Transfer hydrogenation using recyclable polyurea encapsulated palladium: efficient and chemoselective reduction of aryl ketones" Yu, J. Q.; Wu, H. C.; Ramarao, C.; Spencer, J. B.; Ley, S. V. *Chem. Commun.* **2003**, 678.
21. "A mild, catalytic and highly selective method for oxidation of α,β -enones to 1,4-enediones" Yu, J. Q.; Corey, E. J. *J. Am. Chem. Soc.* **2003**, 125, 3232.
22. "Evidence that proton can be the active catalyst in Lewis acid-mediated Hetero-Michael additions" Wabnitz, T. C.; Yu, J. Q.; Spencer, J. B. *Chem. Eur. J.* **2004**, 10, 484.
23. "Pd(OH)₂/C-mediated selective oxidation of silyl enol ethers by *tert*-butylhydroperoxide, a useful method for the conversion of ketones to α,β -enones or β -silyloxy- α,β -enones" Yu, J. Q.; Wu, H. C.; Corey, E. J. *Org. Lett.* **2005**, 7, 1415.
24. "Catalyst-induced changes in a substituted aromatic: a combined approach via experiment and theory" Tan, Y. P.; Khatua, S.; Yu, J. Q.; Jenkins, S. J.; Gaunt, M. J.; Spencer, J. B.; King, D. A. *Surf. Sci.* **2005**, 589, 173.

Independent publications

25. "Highly selective hydration of α -pinene over H-mordenites pretreated with quaternary ammonium salts" Yu, J. Q.*; Zhou, P.; Xiao, S." *Chinese J. Chem. (English)* **1995**, 13, 280.
26. "Recyclable polyurea-microencapsulated Pd(0) nanoparticles: an efficient catalyst for hydrogenolysis of epoxides" Ley, S. V.; Mitchell, C.; Pears, D.; Ramarao, C.; Yu, J. Q., Zhou, W. *Org. Lett.* **2003**, 5, 4665.
27. "Stereospecific deoxygenation of phosphine oxides with retention of configuration using triphenylphosphine as an oxygen acceptor" Wu, H. C.; Yu, J. Q.; Spencer, J. B. *Org. Lett.* **2004**, 6, 4675.
28. "Palladium-catalyzed asymmetric iodination of unactivated C-H bonds under mild conditions" Giri, R.; Chen, X.; Yu, J. Q. *Angew. Chem. Int. Ed.* **2005**, 44, 2112.
29. "Palladium-catalyzed stereoselective oxidation of methyl groups by inexpensive oxidants under mild conditions: a dual role for carboxylic anhydrides in catalytic C-H Bond oxidation" Giri, R.; Liang, J.;

- Lei, J. G.; Li, J. J.; Wang, D. H.; Chen, X.; Naggar, I. C.; Guo, C.; Foxman, B. M.; Yu, J. Q. *Angew. Chem. Int. Ed.* **2005**, *44*, 7420.
30. "Catalytic and stereoselective iodination of prochiral C-H bonds" Giri, R.; Chen, X.; Hao, X. S.; Li, J. J.; Liang, J.; Fan, Z. P.; Yu, J. Q. *Tetrahedron: Asymmetry* **2005**, *16*, 3502. Invited contribution to a special issue on asymmetric oxidation.
31. "Palladium-catalyzed alkylation of aryl C-H bonds with sp³ organotin reagents using benzoquinone as a crucial promoter" Chen, X.; Li, J. J.; Hao, X. S.; Goodhue, C. E.; Yu, J. Q. *J. Am. Chem. Soc.* **2006**, *128*, 78.
32. "Cu(II)-catalyzed functionalizations of aryl C-H bonds using O₂ as an oxidant" Chen, X.; Hao, X. S.; Goodhue, C. E.; Yu, J. Q. *J. Am. Chem. Soc.* **2006**, *128*, 6790.
33. "Palladium-catalyzed oxidation of *Boc*-protected *N*-methylamines using IOAc as the oxidant: a *Boc* directed sp³ C-H bond activation" Wang, D. H.; Wu, D. F.; Yu, J. Q. *Org. Lett.* **2006**, *8*, 3387.
34. "Palladium-catalyzed alkylation of sp² and sp³ C-H bonds with methylboroxine and boronic acids: two distinct C-H activation pathways" Chen, X.; Goodhue, C. E.; Yu, J. Q. *J. Am. Chem. Soc.* **2006**, *128*, 12634.
35. "σ-Chelation-directed C-H functionalizations using Pd(II) and Cu(II) catalysts: regioselectivity, stereoselectivity and catalytic turnover" Giri, R.; Chen, X.; Yu, J. Q. *Org. Biomol. Chem.* **2006**, *4*, 4041. Invited review on an emerging area. Top ten most downloaded OBC articles in Nov 2006.
36. "Converting *gem*-dimethyl groups into cyclopropyl groups via Pd-catalyzed sequential C-H activation and radical cyclization" Giri, R.; Wasa, M.; Breazzano, S. P.; Yu, J. Q. *Org. Lett.* **2006**, *8*, 5685.
37. "Palladium-catalyzed methylation and arylation of sp² and sp³ C-H bonds in simple carboxylic acids" Giri, R.; Mangel, N. L.; Li, J. J.; Wang, D. H.; Breazzano, S. P.; Saunders, L. B.; Yu, J. Q. *J. Am. Chem. Soc.* **2007**, *129*, 3510.
38. "Selective C-H functionalizations" Yu, J. Q.; Giri, R. *Tetrahedron Reports* **2007**, Invited review article.
39. "Iodine monoacetate as a reagent" Giri, R.; Yu, J. Q. *The Encyclopedia of Reagents for Organic Synthesis* **2007** accepted.
40. "Dehydrogenation of inert alkyl groups by Pd(OAc)₂: converting a propyl group into π-allylic complex via a double C-H bond activation," Giri, R.; Mangel, N. L.; Foxman, B.M.; Yu, J. Q. *Org. Lett.* submitted, **2007**.
41. "Asymmetric carbon-carbon bond formation via Pd(II)-catalyzed enantioselective C-H bond activation," Shi, B. F.; Mangel, N.L.; Zhang, Y. H.; Yu, J. Q. *Science*, submitted, **2007**.
42. "Remote C-H activation allows mechanistic insights into directed C-H activation of aryl C-H bonds" Li, J. J.; Giri, R.; Cindric, B.; Yu, J. Q. *Tetrahedron* **2008**, invited contribution.
43. "Pd-catalyzed *mono*-selective *ortho*-halogenation of C-H bonds assisted by counter cations: an orthogonal method to directed *ortho*-lithiation" Mei, T. S.; Giri, R.; Mangel, N.; Yu, J. Q. *Angew. Chem. Int. Ed.* **2007 Submitted**.

Patents

1. New method for one-pot synthesis of optically active α -terpineol ZL90 1 04026.6 (Granted on 7 April 1995)
2. New method for manufacturing n-bornel, ZL92 1 12124.5 (Granted on 18 Sept 1994)
3. Hydroxyl protecting groups and their use, REP - O5785GB
4. Asymmetric synthesis and optical resolution methods, PJF - P7281GB

Filed with Brandeis University

5. New method for asymmetric hydroxylation and iodination of C-H bonds, PCT/US05/27713
6. Cu(II)-catalyzed functionalization of aryl C-H bonds using O₂ as an oxidant, US provisional serial No: 60/192,901
7. Palladium-catalyzed C-H oxidation of *N*-methyl carbamates, US provisional serial No: 60/812,770
8. Palladium-catalyzed alkylation of sp² and sp³ C-H bonds with organoboron reagents, US provisional: pending
9. Palladium-catalyzed carboxylate-directed C-H functionalizations

Highlights

1. Paper 4 was selected as a Highlight in *Chemistry and Industry*, **1998**, and described on page p1232-1233 in the newest edition of Cotton and Wilkinson's *Advanced Inorganic Chemistry*, and page p182-183 in the newest edition of Crabtree's *the Organometallic Chemistry of the Transition Metals*
2. Paper 8 was selected as a Highlight in *Chemistry and Industry*, **1999**
3. Paper 21 and 26 describes a new method to prepare an efficient Pd nano catalyst, see: *Chemical and Engineering News*, **2003**, 81(45), P19; *Chemistry and Industry*, **2003**. This catalyst has been commercialized by Sigma-Aldrich and Avecia
4. Paper 28 was highlighted by Synfacts as an important paper in **2005**
5. Our recent work on C-H activation is described in "Emerging Area" *Org. Biomol. Chem.* **2006**, 4, 4041. Inside front cover. Top ten most accessed OBC articles in Nov **2006**
6. Paper 36 is among the top 20 most accessed ORL articles in Oct-Dec **2006**
7. Our discovery of using IOAc as a superior oxidant for C-H functionalizations is reviewed in Encyclopedia of Reagents for Organic Synthesis.

Awards

1. Journal Award for *Synlett & Synthesis* 2006
2. Camille and Henry Dreyfus New Faculty Award 2004
3. Royal Society University Research Fellowship 2003
4. Fellowship of St John's College, University of Cambridge (JRF) 1998
5. Sino-British Scholarship by British Council and Education Ministry of China 1994
6. President Award for Outstanding Students of Chinese Academy of Sciences 1990

Funding

U.S. NSF grants, CHE-0615716, 2006-2009, Elucidation and exploitation of directed C-H activation reactions

Camille and Henry Dreyfus New Faculty Award, 2004, Elucidation and exploitation of C-H activation pathways

Social activities and hobby

President of Chinese Student and Scholar Association, UK, 1998

Chairman of Chinese Society of Chemical Science and Technology, UK, 1997

Badminton, Cambridge University Cuppers (champion 2001, 2003)