

# Zhen Yang (杨震), Professor

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## EDUCATION

Ph. D. In Chemistry	The Chinese University of Hong Kong (1989-1992)
M.S. in Medicinal Chemistry	Shenyang College of Pharmacy, P. R. China (1983-1986)
B.S. in Medicinal Chemistry	Shenyang College of Pharmacy, P. R. China (1978-1982)

## EXPERIENCE

2006.1-present	Dean of School of Chemical Biology and Biotechnology, PKUSZ
2003.1-present	Director of Key Laboratory of Chemical Genomics, PKUSZ
2001.9-present	Changjiang Professor College of Chemistry, Peking University, Beijing, China Research Interest: Total Synthesis of Natural Product and Organometallic Chemistry Diversity Oriented Synthesis and Chemical Biology
2005.9-present	Director of Chemistry XTL Biopharmaceutical, New York, USA Research Interest: Medicinal Chemistry and Combinatorial Chemistry
2001.5-2005.9	Co-Founder and Director of Chemistry VivoQuest. Inc. New York, USA Research Interest: Anti-Viral Drug Discovery
1998.5-2001.5	Institute fellow Harvard Institute of Chemistry and Cell Biology, Harvard University Research Interest: Diversity Oriented Synthesis
1995.6-1998.5	Assistant Professor The Scripps Research Institute Research Interest: Total Synthesis of Complex Natural Products

1992.5-1995.5 Postdoctoral Fellow  
The Scripps Research Institute  
Topic: Total Syntheses of Taxol, Brevetoxin A and Epothilone A

## HONORS AND AWARDS

2000 Young Investigator Award (abroad), NSF of China  
2001 Glaxo-Simth-Kline Drug Discovery and Development Award (USA)  
2004 Young Investigator Award, NSF of China  
2005 Eli Lilly Scientific Excellence Award (China)  
2008 The Asian Core Program Lectureship Award, the Asian Cutting-Edge Organic Chemistry programs  
2010 ACS *J. Comb. Chem* Editorial Advisory Board

## RESEARCH INTERESTS

Development of synthetic methods for the synthesis of complex natural product molecules and application of synthetic chemistry for drug discovery

## PUBLICATIONS

1) Yang, Z.; Hon, P.-M.; Chui, K.-Y.; Xu, Z.-L.; Chang, H.-M.; Lee, C.-M.; Cui, Y.-X.; Wong, H.N.C.; Poon, C.-D.; Fung, B.-M. "(3-Hydroxypropyl)-7-methoxy-2-(3'-methoxy-4'-hydroxyphenyl)-3-benzo[b]furancarbaldehyde, a novel adenosine A1 receptor ligand, isolated from *Salvia miltiorrhiza* Bunge (Danshen)." *Tetrahedron Lett.*, 1991, 32, 2061-2064.

2) Yang, Z.; Cui, Y.-X.; Wong, H.N.C.; Wang, R.-J.; Mark, T.C.W.; Chang, H.-M.; and Lee, C.-M.; "Anodic oxidation as a synthetic expedient to naphthoquinone and anthraquinone ketals." *Tetrahedron* 1992, 48, 3293-3302.

3) Yang, Z.; Wong, H.N.C.; Hon, B.-M.; Chang, H.-M.; Lee, C.-M.; "A novel synthesis of the dibenzo[b,f]oxepin ring system: 10,11-dihydro-11-hydroxydibenzo [b,f]oxepin-10(11H)-one." *J. Org. Chem.* 1992, 57, 4033-4034.

4) Wong, H.N.C.; Niu, C.-R.; Yang, Z.; Hon, B.-M.; Chang, H.-M.; Lee, C.-M.; "Regiospecific introduction of carbon-3 formal group to 2,5-dialkyl-7-methoxy-benzo[b]furans: synthesis of potential ligand for adenosine A1 receptor." *Tetrahedron* 1992, 48, 10339-10344.

5) Yang, Z.; Liu, H.-B.; Lee, C.-M.; Chang, H.-M.; Wong, H.N.C.; Regioselective introduction of carbon-3 substitutes to 5-alkyl-7-methoxy-2-phenylbenzo[b]furans: synthesis of a novel adenosine A1 receptor ligand and its derivatives." *J. Org. Chem.* 1992, 57, 7248-7252.

6) Nicolaou, K.C.; Yang, Z.; Sorensen, E.J.; Nakada, M. "Synthesis of ABC taxoid ring system via a convergent strategy." *J. Chem. Soc., Chem. Commun.* 1993, 1024-1026.

7) Nicolaou, K.C.; Yang, Z.; Liu, J.-J.; Ueno, H.; Nantermet, P.G.; Guy, R.K.; Claiborne, C.F.; Renaud, J.; Couladouros, E.A.; Paulvannan, K.; Sorensen, E.J. "Total synthesis of Taxol." *Nature*, 1994, 367, 630-634.

8) Nicolaou, K.C.; Yue, E.W.; Naniwa, Y.; Riccardis, F.D.; Nadin, A.; Leresche, J.E.; Greca, S.L.; Yang, Z. "Zaragozic Acid/Squalestatin S1: Synthetic and Retrosynthetic Studies." *Angew. Chem. Int. Ed. Engl.* 1994, 33, 2184-2187.

9) Nicolaou, K.C.; Nadin, A.; Leresche, J.E.; Greca, S.L.; Tsuru, T.; Yue, E.W.; Yang, Z. "Synthesis of the first fully functionalized core of the zaragozic acid/squalestatins." *Angew. Chem. Int. Ed. Engl.* 1994, 33, 2187-2191.

10) Nicolaou, K.C.; Liu, J. J.; Yang, Z.; Nantermet, P.G.; Claiborne, C.F.; Renaud, J.; Guy, R.K.; Shibayama, K. "Construction of A and C ring intermediates and initial attempts to construct the ABC ring system." *J. Am. Chem. Soc.* 1995, 117, 634-644.

11) Nicolaou, K.C.; Yang, Z.; Liu, J. J.; Nantermet, P.G.; Claiborne, C.F.; Renaud, J.; Guy, R.K.; Shibayama, K. "Total synthesis of taxol. 3. Formation of taxol's ABC ring skeleton." *J. Am. Chem. Soc.* 1995, 117, 645-652.

12) Nicolaou, K.C.; Ueno, H.; Liu, J. J.; Nantermet, P.G.; Yang, Z.; Renaud, J.; Paulvannan, K.; Chadha, R. "Total synthesis of taxol. 4. The final stages and completion of the synthesis." *J. Am. Chem. Soc.* 1995, 117, 653-659.

13) Nicolaou, K.C.; Yue, E.W.; Greca, S.L.; Nadin, A.; Yang, Z.; Leresche, J.E.; Tsuru, G.T.;

14) Naniwa, Y.; Riccardis, F. D. "Synthesis of zaragozic acid A/squalestatin S1." *Chem. Eur. J.* 1995, 1, 467-494.

15) Johnson, C. R.; Xu, Y-P.; Nicolaou, K. C.; Yang, Z.; Guy, R. K.; Dong, J.-G.; Berova, N. "Enzymatic resolution of a key stereochemical intermediate for the synthesis of taxol." *Tetrahedron Lett.* 1995, 36, 3291-3294.

16) Nicolaou, K.C.; Theodorakis, E.A.; Rutjies, F.P.J.T.; Sato, M.; Tiebes, J.; Xiao, X.-Y.; Hwang, C.-K.; Duggan, M. E.; Yang, Z.; Couladouros, E.A.; Sato, F.; Shin, J.; He, H.-M.; Bleckman, T. "Total synthesis of brevetoxin B. 2. Second generation strategies and construction of the dioxepane region [DEFG]." *J. Am. Chem. Soc.* 1995, 117, 10239-10251.

17) Nicolaou, K.C.; He, Y.; Vourloumis, D.; Vallberg, H.; Yang, Z. "An approach to

epothilones based on olefin metathesis." *Angew. Chem. Int. Ed. Engl.* 1996, 35, 2399-2401.

18) Yang, Z.; He, Y.; Vourloumis, D.; Vallberg, H.; Nicolaou, K.C. "Total Synthesis of Epothilone A: The Olefin Metathesis Approach" *Angew. Chem. Int. Ed. Engl.* 1997, 36, 166-168.

19) Nicolaou, K.C.; Sarabia, F.; Ninkovic, S.; Yang, Z. "Total synthesis of epothilone A: the macrolactonization approach." *Angew. Chem. Int. Ed. Engl.* 1997, 36, 525-527.

20) Nicolaou, K.C.; Winssinger, N.; Pastor, J.; Ninkovic, S.; Sarabia, F.; He, Y.; Vourloumis, D.; Yang, Z.; Li, T.; Giannakakou, P.; Hamel, E. "Synthesis of epothilones A and B in solid and solution phase." *Nature* 1997, 387, 268-272.

21) Nicolaou, K.C.; Yang, Z.; Quелlette, M.; Shi, G.-Q.; Gartner, P.; Gunzner, J.L.; Agrios, C.; Huber, R.; Chadha, R.; Huang, D.H. "New synthetic technology for the construction of 9-membered ring cyclic ethers. Construction of the EFGH ring skeleton of brevetoxin A." *J. Am. Chem. Soc.* 1997, 119, 8105-8106.

22) Nicolaou, K.C.; Shi, G.-Q.; Gunzner, J.L.; Gartner, P.; Yang, Z. "Palladium-catalyzed functionalization of lactones via their cyclic ketene acetal phosphates. Efficient new synthetic technology for the construction of medium and large cyclic ether" *J. Am. Chem. Soc.* 1997, 119, 5467-5468.

23) Nicolaou, K.C.; He, Y.; Vourloumis, D.; Vallberg, H.; Roschangar, F.; Sarabia, F.; Ninkovic, S.; Yang, Z. "The olefin metathesis approach to epothilone A and its analogs" *J. Am. Chem. Soc.* 1997, 119, 7960-7973.

24) Nicolaou, K.C.; Ninkovic, S.; Sarabia, F.; Vourloumis, D.; He, Y.; Vallberg, H.; Yang, Z. "Total synthesis of epothilones A and B via a macrolactonization based strategy." *J. Am. Chem. Soc.* 1997, 119, 7974-7991.

25) Nicolaou, K. C.; Yang, Z.; Shi, G.-Q.; Gunzner, J. L.; Agrios, K. A.; Gartner, P. "Total synthesis of Brevetoxin A" *Nature* 1998, 392, 264-269.

26) McAlpine, S. R.; Schreiber, S. L.; Sorger, P.; Copeland, J.; Yang, Z. "Comparison of four solid support resins using optical analysis, and analysis of their release in aqueous media. a condensation library investigates the advantages of each solid support." *Book of Abstracts, 217th ACS National Meeting, Anaheim, Calif., March 21-25 (1999), ORGN-170.* Publisher: American Chemical Society, Washington, D. C. CODEN: 67GHA6. AN 1999:145603 CAPLUS.

27) Nicolaou, K. C.; Gunzner, J. L.; Shi, G.-Q.; Agrios, K. A.; Gartner, P.; Yang, Z. "Total synthesis of brevetoxin A: Part 4: final stages and completion" *Chem. Eur. J.*

1999, 5(2), 646-658.

28) Nicolaou, K. C.; Shi, G. Q.; Gunzner, J. L.; Gartner, P.; Wallace, P. A.; Ouellette, M. A.; Shi, S.-H.; Bunnage, M. E.; Agrios, K. A.; Veale, C. A.; Hwang, C.-K.; Hutchinson, J.; Prasad, C. V. C.; Ogilvie, W. W.; Yang, Z. "Total synthesis of brevetoxin A: Part 3: construction of GHIJ and BCDE ring systems" *Chem. Eur. J.* 1999, 5(2), 628-645.

29) Nicolaou, K. C.; Wallace, P. A.; Shi, S. H.; Ouellette, M. A.; Bunnage, M. E.; Gunzner, J. L.; Agrios, K. A.; Shi, G. Q.; Gartner, P.; Yang, Z. "Total synthesis of brevetoxin A: Part 2: second generation strategy and construction of EFGH model system" *Chem. Eur. J.* 1999, 5(2), 618-627.

30) Nicolaou, K. C.; Bunnage, M. E.; McGarry, D. G.; Shi, S. H.; Somers, P. K.; Wallace, Paul A.; Chu, X. J.; Agrios, K. A.; Gunzner, J. L.; Yang, Z. "Total synthesis of brevetoxin A: Part 1: first generation strategy and construction of BCD ring system" *Chem. Eur. J.* 1999, 5(2), 599-617.

31) Nan, Y.; Yang, Z. "Nickel-Catalyzed Cross-Coupling of Cyclohexenyl Phosphate and Arylboronic Acids" *Tetrahedron Lett.* 1999, 40, 3321-3324.

32) Nan, Y.; Miao, H.; Yang, Z. "A new complex of palladium-thiourea and carbon tetrabromide catalyzed carbonylative annulation of hydroxy-phenylacetylenes; Efficient new synthetic technology for the synthesis- $\alpha$  of 2,3-disubstituted benzo[b]furans" *Org. Lett.* 2000, 2, 297.

33) Maio, H.; Yang, Z. " Regio-specific carbonylative annulation of iodophenol acetates and acetylenes to construct the flavones by a new catalyst of palladium-thiourea-dppp complex." *Org. Lett.* 2000, 2, 1765-1768.

34) Hu, Y.-H.; Zhang, Y.; Fathi, R.; and Yang, Z. "Palladium-catalyzed Carbonylative Annulation of *o*-Alkynylphenols: Syntheses of 2-Substituted-3-aryl-benzo[b]furans." *J. Org. Chem.* 2002, 67, 2365-2368.

35) Liao, Y.; Fathi, R.; Reitman, M.; Zhang, Y.; Yang, Z. "Optimisation study of Sonogashira Cross-Coupling Reaction on High-Loading Macrobeads Using a Silyl Linker Systematic Study of Sonogashira Cross-Coupling Reaction on the High-Loading Macrobeads Using a Silyl Linker." *Tetrahedron Lett.* 2001, 42, 1815-1818.

36) Hu, Y.-H.; Yang, Z. "The Palladium-Mediated Intramolecular Carbonylative Annulation of *o*-Alkynylphenols to Synthesize Benzo[b]furo[3,4-d]furan-1-ones" *Org. Lett.* 2001, 3, 1387-1390.

37) Wu, J.; Liao, Y.; Yang, Z. "The Synthesis of 4-Substituted Coumarins via the

Palladium-catalyzed Cross-couplings of 4-Tosyl-coumarins with Terminal Acetylenes and Organozinc Reagents". *J. Org. Chem.* 2001, 66, 3642-3645.

38)Wu, J.; Yang, Z. "The Nickel-Catalyzed Cross-Couplings of 4-Diethylphosphono-oxycoumarins with Organozinc Reagents: An Efficient New Methodology for the Synthesis of 4-Substituted Coumarins" *J. Org. Chem.* 2001, 66, 7875-7878.

39)Hu, Y.-H.; Zhang, Y.; Yang, Z.; Fathi, R. "Palladium-catalyzed Carbonylative Annulation of o-Alkynylphenols: Synthesis of 2-Substituted-3-aryl-benzo[b]furans" *J. Org. Chem.* 2002, 67, 2365-2368.

40)Wu, J.; Wang, L.; Fathi, R.; Yang, Z. "Palladium-catalyzed cross-coupling reactions of 4-tosylcoumarin and arylboronic acids: synthesis of 4-arylcoumarin compounds" *Tetrahedron Lett.* 2002, 43, 4395-4398.

41)Yun, L.; Reitman, M.; Zhang, Y.; Fathi, R.; Yang, Z. "Palladium(II)-mediated cascade carbonylative annulation of o-alkynylphenols on a silyl linker based macrobeads: a combinatorial synthesis of a 2-substituted-benzo [b]furan-3-carboxylate library" *Org. Lett.* 2002, 4, 2607-2609.

42)Zhu, Q.; Wu, J.; Fathi, R.; Yang, Z. "The First Observation of Phenyliodonium Zwitterion as Efficient Electrophile in the Palladium Catalyzed Suzuki-type Reaction: a Novel Method for the Synthesis of 3-Aryl-4-hydroxyl-coumarins" *Org. Lett.* 2002, 4, 3333-3336.

43)Liao, Y.; Fathi, R.; Yang, Z. "Convergent solid-phase synthesis of symmetrical benzo[b]furan's dimerizer" *J. Comb. Chem.* 2003, 5, 79-81.

44)Wu, J.; Zhu, Q.; Wang, L.; Fathi, R.; Yang, Z. "Palladium-Catalyzed Cross-Coupling Reactions of 4-Tosyl-2(5H)-furanone with Boronic Acids: A Facile and Efficient Route to Generate 4-Substituted 2(5H)-Furanones" *J. Org. Chem.* 2003, 68, 670 - 673.

45)Liao, Y.; Fathi, R.; Yang, Z. "A Highly-Efficient Aliphatic Acetylenic Homocoupling Catalyzed by a Novel Combination of AgOTs-CuCl<sub>2</sub>-TMEDA and Its Application for the Solid Phase Synthesis of bis-Benzo[b]furan-linked 1,3-Diynes" *Org. Lett.* 2003, 5, 909-912.

46)Mao S. Cheng, M. S.; Wang, Q. L.; Tian, Q.; Song, H. Y.; Liu, Y. X.; Li, Q.; Xu, X.; Miao, H. D.; Yao, X. S.; Yang, Z. "Total Synthesis of Methyl Protodioscin: A Potent Agent with Anti-tumor Activity" *J. Org. Chem.* 2003, 68, 3658-3662.

47)Liao, Y.; Hu, Y.-H.; Wu, J.; Zhu, Q.; Donovan, M.; Fathi, R.; Yang, Z. "Diversity Oriented Synthesis and Branching Reaction Pathway to Generate Natural

Product-like Compounds" *Curr. Med. Chem.* 2003, 10, 2285-2316.

48) Li, C.-C.; Xie, Z.-S.; Zhang, Y.-D.; Yang, Z. "Total Synthesis of Wedelolactone". *J. Org. Chem.* 2003, 68, 8500-8506.

49) Dai, M.-J.; Wang, C.-H.; Xiang, J.; Liang, B.; Luo, T.-P.; Chen, J.-H.; Yang, Z. "Development of Thiourea-based Ligands for the Palladium-catalyzed Bismethoxycarbonylation of Terminal Olefins" *Eur. J. Org. Chem.* 2003, 4346-4348.

50) Kobori, M.; Yang, Z.; Heissmeyer, V.; Zhu, H.; Jung, Y.-K.; Gakidis, M. A. M.; Rao, A.; Sekine, T.; Ikegami, F.; Yuan, C.; Yuan, J. "Wedelolactone suppresses LPS-induced caspase-11 expression by directly inhibiting the IKK complex" *Cell Death and Differentiation* 2003,

51) Dai, M.; Liang, B.; Wang, C.; Chen, J.; Yang, Z. "Synthesis of a Novel C2-Symmetric Thiourea and Its Application in the Pd-Catalyzed Cross-Coupling Reactions with Arenediazonium Salts under Aerobic Conditions" *Org. Lett.* 2004, 6, 221-224.

52) Xiang, Z.; Luo, T.; Lu, K.; Cui, J.; Shi, X.; Fathi, R.; Chen, J.; Yang, Z. "Concise Synthesis of Isoquinoline via the Ugi and Heck Reactions" *Org. Lett.* 2004, 6, 3155-3158.

53) Xiong, Z.; Wang, N.; Dai, M.; Li, A.; Chen, J.; Yang, Z. "Synthesis of Novel Palladacycles and Their Application in Heck and Suzuki Reactions under Aerobic Conditions" *Org. Lett.* 2004, 6, 3337-3340.

54) Dai, M.; Liang, B.; Wang, C.; You, Z.; Xiang, J.; Dong, G.; Chen, J.; Yang, Z. "A Novel Thiourea Ligand Applied in the Pd-Catalyzed Heck, Suzuki, Suzuki Carbonylative Reactions" *Adv. Synth. Catal.* 2004, 346, 1669-1673.

55) Liang, B.; Dai, M.; Chen, J.; Yang, Z. "Copper-Free Sonogashira Coupling Reaction with PdCl<sub>2</sub> in Water under Aerobic Conditions" *J. Org. Chem.* 2005, 70, 391-393.

56) Tang, Y.; Deng, L.; Zhang, Y.; Dong, G.; Chen, J.; Yang, Z. "Tetramethyl Thiourea/Co<sub>2</sub>(CO)<sub>8</sub>-Catalyzed Pauson-Khand Reaction under Balloon Pressure of CO" *Org. Lett.* 2005, 7, 593-595.

57) Tang, Y.; Zhang, Y.; Dai, M.; Luo, T.; Deng, L.; Chen, J.; Yang, Z. "A Highly Efficient Synthesis of the FGH Ring of Micrandilactone A. Application of Thioureas as Ligands in the Co-catalyzed Pauson-Khand Reaction and Pd-Catalyzed Carbonylative Annulation" *Org. Lett.* 2005, 7, 885-888.

58) Li, C.; Liang, S.; Zhang, X.; Xie, Z.; Chen, J.; Wu, Y.; Yang, Z. "Exploring an Expedient

IMDA Reaction Approach to Construct the Guanacastepene Core" *Org. Lett.* 2005, 7, 3709.

59)Liang, B.; Huang, M.; You, Z.; Xiong, Z.; Lu, K.; Fathi, R.; Chen, J. ; Yang, Z. "Pd-Catalyzed Copper-Free Carbonylative Sonogashira Reaction of Aryl Iodides with Alkynes for the Synthesis of Alkynyl Ketones and Flavones by Using Water as a Solvent" *J. Org. Chem.* 2005, 70, 6097.

60)Tang, Y.; Deng, L.; Zhang, Y.; Dong, G.; Chen, J.; Yang, Z. "Thioureas as Ligands in the Pd-Catalyzed Intramolecular Pauson-Khand Reaction" *Org. Lett.* 2005, 7, 1657.

61)Liao, Y.; Smith, J.; Fathi, R.; Yang, Z. *Org. Lett.* 2005, 7, 2707-2709.

62)Wang, C.; Hu, R.; Liang, S.; Chen, J.; Yang, Z.; Pei, J. "Linear C<sub>2</sub>-symmetric polycyclic benzodithiophene: efficient, highly diversified approaches and the optical properties" *Tetrahedron Lett.* 2005, 46, 8153.

63)Lu, K.; Luo, T.; Xiang, Z.; You, Z.; Fathi, R.; Chen, J.; Yang, Z. "A Concise and Diversity-Oriented Strategy for the Synthesis of Benzofurans and Indoles via Ugi and Diels-Alder Reaction" *J. Comb. Chem.* 2005, 7, 958.

64)Zhang, Y.; Tang, Y.; Luo, T.; Shen, J.; Chen, J.; Yang, Z. "Application of RCM Reaction in the Construction of ABC Ring of Micrandilactone A" *Org. Lett.* 2006, 8, 2006.

65)Lu, K.; Huang, M.; Xiang, Z.; Liu, Y.; Chen, J.; Yang, Z. "Development of a Concise and Diversity-Oriented Approach for the Synthesis of Plecomacrolides via the Diene-Ene RCM" *Org. Lett.* 2006, 8, 1193.

66)Ma, Z.; Xiang, Z.; Luo, T.; Lu, K.; Xu, Z.; Chen, J. Yang, Z. "Synthesis of Functionalized Quinolines via Ugi and Pd-Catalyzed Intramolecular Arylation Reactions" *J. Comb. Chem.* 2006, 8, 696.

67)Li, C. ; Wang, C. ; Liang, B. ; Zhang, X. ; Deng, L. ; Liang, S. ; Chen, J. ; Wu, Y. ; Yang, Z. " Synthetic Study of 1,3-Butadiene-Based IMDA Approach to Construct a [5-7-6] Tricyclic Core and Its Application to the Total Synthesis of C8-epi-Guanacastepene O" *J. Org. Chem.* 2006, 71, 6892.

68)Wu, X.; Zhong, H.; Song, J.; Damoiseaux, R. ; Yang, Z. ; Lin S. "Mycophenolic Acid is a Potent Inhibitor of Angiogenesis" *Arterioscler Thromb Vasc Biol.* 2006, 26, 2414-6.

69)Liu, Y.; Lu, K.; Dai, M.; Wang, K.; Wu, W.; Chen, J.; Yang, Z. "An Efficient One-Pot Asymmetric Synthesis of Biaryl Compounds via Diels-



Alder/Retro-Diels-Alder Cascade Reactions" *Org. Lett.* 2007, 9, 805.

70) Che, C.; Xiang, J.; Wang, G. X.; Quan, J.-M.; Yang, Z. "A One-Pot Synthesis of Quinoline-based Tetracycles by a Tandem Three-Component Reaction" *J. Comb. Chem.* 2007, 9, 982.

71) Liang, B.; Liu, J.; Gao, Y.-X.; Shu, D.-X.; Wongkhan, K.; Lan, Y.; Li, A.; Batsanov, A. S.; Howard, J. A. H.; Marder, T. B.; Chen, J.-H.; Yang, Z. "Synthesis of Thiourea-Oxazolines, a New Class of Chiral S,N-Heterobidentate Ligands: Application in Pd-Catalyzed Asymmetric Bis-methoxycarbonylation of Terminal Olefins" *Organometallics* 2007, 26, 4756.

72) Deng, L.-J.; Liu, J.; Huang, J.-Q.; Hu, Y.; Chen, M.; Lan, Y.; Chen, J.-H.; Lei, A.; Yang, Z. "Effect of LiCl on Tuning the Reactivity of Pd-TMTU Catalyzed Pauson-Khand Reactions" *Synthesis* 2007, 16, 2565.

73) Che, C.; Xiang, J.; Wang, G. X.; Fathi, R.; Quan, J. M.; Yang, Z. "One-pot synthesis of quinoline-based tetracycles by a tandem three-component reaction" *Journal of Combinatorial Chemistry* 2007, 9, 982-989.

74) Li, Y. Z.; Zou, H. X.; Gong, J. X.; Xiang, J.; Luo, T. P.; Quan, J. M.; Wang, G. X.; Yang, Z. "Efficient synthesis of Maleimides and Carbazoles via Zn(OTf)<sub>2</sub>-catalyzed tandem annulations of isonitriles and allenic esters" *Organic Letters* 2007, 9, 4057-4060.

75) Li, Z. T.; Gao, Y. X.; Jiao, Z. D.; Wu, N.; Wang, D. Z.; Yang, Z. "Diversity-Oriented Synthesis of Fused Pyran gamma-Lactones via an Efficient Pd-Thiourea-Catalyzed Alkoxy carbonylative Annulation" *Organic Letters* 2008, 10, 5163-5166.

76) Li, Z. T.; Gao, Y. X.; Tang, Y. F.; Dai, M. J.; Wang, G. X.; Wang, Z. G.; Yang, Z. "Total synthesis of crisamicin A" *Organic Letters* 2008, 10, 3017-3020.

77) Liu, J.; Deng, Y.; Wang, H. B.; Zhang, H.; Yu, G. X.; Wu, B. B.; Zhang, H.; Li, Q.; Marder, T. B.; Yang, Z.; Lei, A. W. "Effective Pd-nanoparticle (PdNP)-catalyzed Negishi coupling involving alkylzinc reagents at room temperature" *Organic Letters* 2008, 10, 2661-2664.

78) Liu, J.; Liang, B.; Shu, D. X.; Hu, Y. H.; Yang, Z.; Lei, A. W. "Alkoxy carbonylation of aryl iodides catalyzed by Pd with a thiourea type ligand under balloon pressure of CO" *Tetrahedron* 2008, 64, 9581-9584.

79) Liu, Y. X.; Li, X. B.; Lin, G.; Xiang, Z.; Xiang, J.; Zhao, M. Z.; Chen, J. H.; Yang, Z. "Synthesis of catechins via thiourea/AuCl<sub>3</sub>-catalyzed cycloalkylation of aryl epoxides" *Journal of Organic Chemistry* 2008, 73, 4625-4629.

80)Wang, N. D.; Xiang, J.; Ma, Z. B.; Quan, J. M.; Chen, J. H.; Yang, Z. "A Concise and Diversity-Oriented Approach to the Synthesis of SAG Derivatives" *Journal of Combinatorial Chemistry* 2008, 10, 825-834.

81)Zhang, Y. D.; Ren, W. W.; Lan, Y.; Xiao, Q.; Wang, K.; Xu, J.; Chen, J. H.; Yang, Z. "Stereoselective construction of an unprecedented 7-8 fused ring system in micrandilactone a by [3,3]-sigmatropic rearrangement" *Organic Letters* 2008, 10, 665-668.

82)Che, C.; Li, W. Z.; Lin, S. Y.; Chen, J. W.; Zheng, J.; Wu, J. C.; Zheng, Q. X.; Zhang, G. Q.; Yang, Z.; Jiang, B. W. "Magnetic nanoparticle-supported Hoveyda-Grubbs catalysts for ring-closing metathesis reactions" *Chemical Communications* 2009, 5990-5992.

83)Cui, Y.; Jiang, H.; Li, Z. T.; Wu, N.; Yang, Z.; Quan, J. M. "Unexpected Regioselectivity in the Synthesis of Pyranonaphthoquinone via the Diels-Alder Reaction" *Organic Letters* 2009, 11, 4628-4631.

84)Gong, J.; Lin, G.; Li, C. C.; Yang, Z. "Synthetic Study toward the Total Synthesis of Maoecrystal V" *Organic Letters* 2009, 11, 4770-4773.

85)Lan, Y.; Deng, L. J.; Liu, J.; Wang, C.; Wiest, O.; Yang, Z.; Wu, Y. D. "On the Mechanism of the Palladium Catalyzed Intramolecular Pauson-Khand-Type Reaction" *Journal of Organic Chemistry* 2009, 74, 5049-5058.

86)Liu, J.; Wang, H. B.; Zhang, H.; Wu, X. J.; Zhang, H.; Deng, Y.; Yang, Z.; Lei, A. W. "Identification of a Highly Efficient Alkylated Pincer Thioimido-Palladium(II) Complex as the Active Catalyst in Negishi Coupling" *Chemistry-a European Journal* 2009, 15, 4437-4445.

87)Liu, L. Z.; Gao, Y. X.; Che, C.; Wu, N.; Wang, D. Z.; Li, C. C.; Yang, Z. "A model study for the concise construction of the oxapentacyclic core of cortistatins through intramolecular Diels-Alder and oxidative dearomatization-cyclization reactions" *Chemical Communications* 2009, 662-664.

88)Wang, H. B.; Liu, J.; Deng, Y.; Min, T. Y.; Yu, G. X.; Xu, X. J.; Yang, Z.; Lei, A. W. "Pincer Thioamide and Pincer Thioimide Palladium Complexes Catalyze Highly Efficient Negishi Coupling of Primary and Secondary Alkyl Zinc Reagents at Room Temperature" *Chemistry-a European Journal* 2009, 15, 1499-1507.

89)Wang, L.; Gong, J. X.; Deng, L. J.; Xiang, Z.; Chen, Z. X.; Wang, Y. F.; Chen, J. H.; Yang, Z. "Formal Total Synthesis of N-Methylmaysenine" *Organic Letters* 2009, 11, 1809-1812.

90)Xiang, J.; Yang, H. B.; Che, C.; Zou, H. X.; Yang, H. S.; Wei, Y. Q.; Quan, J. M.; Zhang, H.; Yang, Z.; Lin, S. "Identifying Tumor Cell Growth Inhibitors by Combinatorial Chemistry and Zebrafish Assays" Plos One 2009, 4.

91)Xiao, Q.; Wang, W. H.; Liu, G.; Meng, F. K.; Chen, J. H.; Yang, Z.; Shi, Z. J. "Direct Imidation to Construct 1H-Benzo[d]imidazole through Pd-II-Catalyzed C-H Activation Promoted by Thiourea" Chemistry-a European Journal 2009, 15, 7292-7296.

92)Yang, H. B.; Xiang, J.; Wang, N. D.; Zhao, Y.; Hyman, J.; Li, S.; Jiang, J.; Chen, J. K.; Yang, Z.; Lin, S. "Converse Conformational Control of Smoothed Activity by Structurally Related Small Molecules" Journal of Biological Chemistry 2009, 284, 20876-20884.

93)Zhong, H. B.; Zou, H. X.; Semenov, M. V.; Moshinsky, D.; He, X.; Huang, H. G.; Li, S.; Quan, J. M.; Yang, Z.; Lin, S. "Characterization and development of novel small-molecules inhibiting GSK3 and activating Wnt signaling" Molecular Biosystems 2009, 5, 1356-1360.

94)Che, C.; Liu, L. Z.; Gong, J. X.; Yang, Y. F.; Wang, G. X.; Quan, J. M.; Yang, Z. "Construction of All-Carbon Quaternary Center by R<sub>2</sub>AlCl-Mediated Ring-Opening Reaction of Oxacycles" Organic Letters 2010, 12, 488-491.

95)Cui, Y.; Jiao, Z. D.; Gong, J. X.; Yu, Q.; Zheng, X. F.; Quan, J. M.; Luo, M.; Yang, Z. "Development of New Stereodiverse Diaminocyclitols as Inhibitors of Influenza Virus Neuraminidase" Organic Letters 2010, 12, 4-7.

96)Xu, L. M.; Li, B. J.; Yang, Z.; Shi, Z. J. "Organopalladium(IV) chemistry" Chemical Society Reviews 2010, 39, 712-733.

97)Zou, H. X.; Zhou, L. Y.; Li, Y. Z.; Cui, Y.; Zhong, H. B.; Pan, Z. Y.; Yang, Z.; Quan, J. M. "Benzo[e]isoindole-1,3-diones as Potential Inhibitors of Glycogen Synthase Kinase-3 (GSK-3). Synthesis, Kinase Inhibitory Activity, Zebrafish Phenotype, and Modeling of Binding Mode" Journal of Medicinal Chemistry 2010, 53, 994-1003.

## **PATENT**

1)Nicolaou, K. C.; Sarabia, F.; Ninkovic, S.; Yang, Z.; He, H.; Vourloumis, D.; Vallberg, H. "Synthetic Approaches for Epothilone A and Related Analogs" U.S. Patent, Serial No. 08/856,533.

2)Nicolaou, K. C.; He, Y.; Ninkovic, S.; Pastor, J.; Roschangar, F.; Sarabia, F.; Vallberg, H.; Vourloumis, D.; Winssinger, N.; Yang, Z.; King, N.P. "Epothilone

Analogs" U.S. Patent, Serial No. 08/923,869.

3) Nicolaou, K.C. Sorenson, E.J.; Nakada, M.; Yang, Z. "Strategy for ABC taxoid ring synthesis." U.S. Patent, Serial No. 08/197,637.

4) Nicolaou, K. C.; Yang, Z.; Liu, J. J.; Ueno, H.; Nantermet, P. G. "Total synthesis of taxol and taxol analogs" U.S., 15 pp. Cont.-in-part of U.S. Ser. No. 193,263. CODEN: USXXAM. US 5461169 A 951024. CAN 124:87427 CAPLUS.

5) Yang, Z.; Kobori, M.; Yuan, J.-Y. "Methods for Treating Cell Death Disease and Inflammation" International patent No. PCT/US00/42808, and US 6,552,071 B2

6) Liao, Y.; Fathi, R.; Yang, Z. "Benzo[b]furan's Dimers" Patent No.: US 6,855,822 B2.

### **BOOK CHAPTERS**

1. Xue-Long Hou, Zhen Yang and Henry N. C. Wong  
"Five-Membered Rings Systems: Furans and Benzofurans",  
Progress in Heterocyclic Chemistry, Vol. 13, Amsterdam, pp. 130-166 (2001)

2. Xue-Long Hou, Zhen Yang and Henry N. C. Wong  
"Five-Membered Rings Systems: Furans and Benzofurans",  
Progress in Heterocyclic Chemistry, Vol. 14, Amsterdam, pp. 139-179 (2002)

3. Xue-Long Hou, Zhen Yang and Henry N. C. Wong  
"Five-Membered Rings Systems: Furans and Benzofurans",  
Progress in Heterocyclic Chemistry, Vol. 15, Amsterdam, pp. 167-205 (2003)

4. Xue-Long Hou, Zhen Yang, and Henry N. C. Wong  
"Five-Membered Rings Systems: Furans and Benzofurans",  
Progress in Heterocyclic Chemistry, Vol. 16, Amsterdam, 245-327 (2004).

5. Xue-Long Hou, Zhen Yang, Kap-Sun Yeung and Henry N. C. Wong  
"Five-Membered Rings Systems: Furans and Benzofurans",  
Progress in Heterocyclic Chemistry, Vol. 16, Amsterdam, 2005 (in print).