

## Robert M. Waymouth

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### Personal Data

Birth: May 20, 1960, Warner Robins, Ga.

### Education

- 1987 Ph.D., Chemistry, California Institute of Technology, Pasadena, CA  
Research Advisor: Professor R.H. Grubbs
- 1982 B.A., Chemistry, Summa Cum Laude, Washington and Lee University, Lexington, VA  
B.S., Mathematics, Summa Cum Laude, Washington and Lee University, Lexington, VA  
Research Advisor: Professor J.K. Shillington

### Professional

- 2014 Professor, by Courtesy, Chemical Engineering, Stanford University, Stanford CA
- 2000- Robert Eckles Swain Professor of Chemistry, Stanford, CA
- 1997- Professor, Stanford University, Stanford, CA
- 1994-97 Associate Professor, Stanford University, Stanford, CA
- 1988-94 Assistant Professor, Stanford University, Stanford, CA
- 1987 Postdoctoral Research Fellow, Institut fur Polymere, ETH Zurich, Switzerland  
Research Advisor: Professor Piero Pino

### Fellowships and Awards

- 2015 Butler Lectureship, University of Florida
- 2012 Presidential Green Chemistry Challenge Award, with James L. Hedrick of IBM (EPA)
- 2009 Cooperative Research Award in Polymer Science and Engineering  
with James L. Hedrick of IBM (ACS PMSE Division)
- 2005 Bass University Fellow in Undergraduate Education, Stanford
- 2001 Alexander von Humboldt Senior Scientist Award
- 1997 Wilhelm Manchot Professorship, Technical University of Munich
- 1997 Walter J. Gores Award for Excellence in Teaching, Stanford
- 1996 Alan T. Waterman Award, National Science Foundation
- 1995 Fresenius Award, Phi Lambda Upsilon, Honorary Chemical Society
- 1995 Arthur C. Cope Scholar Award, American Chemical Society
- 1994 Bing Fellowship, Undergraduate Teaching Award, Stanford
- 1993 Phi Beta Kappa Undergraduate Teaching Award, Stanford
- 1993 Alfred P. Sloan Fellowship, A. P. Sloan Foundation
- 1993 Union Carbide Innovation Recognition Awardee, Union Carbide
- 1992 National Science Foundation Young Investigator Award, NSF
- 1989 Exxon Educational Foundation, Research and Training Award, Stanford
- 1986 SOHIO Fellowship in Catalysis, California Institute of Technology
- 1985 W.R. Grace Fellowship, California Institute of Technology
- 1982 James L. Howe Chemistry Award, Blue Ridge ACS Section
- 1980 Taylor Scholarship in Mathematics, Phi Beta Kappa

### Professional Activities

Science Advisory Board: KAUST Catalysis Center; Science Advisory Board: Washington and Lee University, International Advisory Board, International Symposium on Homogeneous Catalysis, Editorial Board: Journal of Polymer Science, Chemistry; Co-Chair: Stanford Task Force on Advancing the Culture of Laboratory Safety

## Publications

1. Waymouth, R.M.; Santarsiero, B.D.; Grubbs, R.H. "Trigonal Bipyramidal Methyl Group Between Two Zirconocene Ketene Centers" *J. Am. Chem. Soc.* **1984**, *106*, 4050-4051.
2. Waymouth, R.M.; Santarsiero, B.D.; Coats, R.J.; Brownikowski, M.J.; Grubbs, R.H. "Trinuclear Zr<sub>2</sub>Al  $\mu$ -Ketene Complexes Containing Bridging Ligands. Implications for Transmetalation Reactions and CO Reduction Chemistry" *J. Am. Chem. Soc.* **1986**, *108*, 1427-1441.
3. Waymouth, R.M.; Clauser, K.R.; Grubbs, R.H. "Reactivity of Group 4 Acyl Complexes: Synthesis of Zirconium Ketone Complexes" *J. Am. Chem. Soc.* **1986**, *108*, 6385-6387.
4. Waymouth, R.M., Bangerter, F.; Pino, P. "Stereochemistry of PtO<sub>2</sub>-Catalyzed Hydrogenation of [Ethylene-bis(indenyl)] zirconocene Dichlorides" *Inorg. Chem.* **1988**, *27*, 758.
5. Waymouth, R.M., Grubbs, R.H. "Facile Intramolecular Coupling of Alkyl and Acyl Ligands Induced by Lewis Acids: Mechanistic Studies on the Formation of Zirconium Ketone Complexes" *Organometallics* **1988**, *7*, 1631-1635.
6. Consiglio, G.; Waymouth, R. "Enantioselective Homogeneous Catalysis Involving Transition Metal Allyl Intermediates" *Chem. Rev.* **1989**, *89*, 257.
7. Waymouth, R.M.; Potter, K.S.; Schaefer, W.P.; Grubbs, R.H. "Structure of a Trinuclear Zr<sub>2</sub>Al  $\mu$ -Ketone Complex with a Bridging Trigonal Bipyramidal Methyl Group", *Organometallics*, **1990**, *9*, 2843.
8. Waymouth, R.M.; Pino, P. "Enantioselective Hydrogenation of Olefins with Homogeneous Ziegler-Natta Catalytic Systems", *J. Am. Chem. Soc.*, **1990**, *112*, 4911.
9. Resconi, L.; Waymouth, R.M. "Diastereoselectivity in the Cyclopolymerization of 1,5-Hexadiene." *J. Am. Chem. Soc.*, **1990**, *112*, 4953.
10. Resconi, L.; Coates, G.; Mogstad, A.; Waymouth, R.M. "Stereospecific Cyclopolymerization with Group 4 Metallocenes" *J. Macromol. Sci., Chem.* **1991**, *A28*, 1225-1234.
11. Knight, K.; Waymouth, R.M. "Zirconium Catalyzed Diene and Alkyl-Alkene Coupling Reactions with Magnesium Reagents" *J. Am. Chem. Soc.* **1991**, *113*, 6268-6270.
12. Coates, G.W.; Waymouth, R.M. "Enantioselective Cyclopolymerization of 1,5-Hexadiene: Optically Active Poly(methylene-1,3-cyclopentane)" *J. Am. Chem. Soc.* **1991**, *113*, 6270-6272.
13. Kesti, M.J.; Waymouth, R.M. "Olefin Hydrosilation Catalyzed by Zirconocene Complexes" *J. Organomet. Chem.*, **1991**, *417*, C12-C15.
14. Banovetz, J.P.; Stein, K. M.; Waymouth, R.M. "Stereoselectivity in the Catalytic Oligomerization of Phenylsilane" *Organometallics*, **1991**, *10*, 3430-3432.
15. Kesti, M. R.; Waymouth, R.M. "Group 4 Metallocene Olefin Hydrosilation Catalysts" *Organometallics*, **1992**, *11*, 1095-1103.
16. Mogstad, A.; Waymouth, R.M. "Chain Transfer to Aluminum in the Homogeneous Cyclopolymerization of 1,5-Hexadiene" *Macromolecules*, **1992**, *25*, 2282-2284.
17. Kesti, M.R.; Waymouth, R.M. "Highly Chemo- and Stereoselective Cyclopolymerization of 2-Methyl-1,5-Hexadiene: Chain Transfer via  $\beta$ -CH<sub>3</sub> elimination", *J. Am. Chem. Soc.*, **1992**, *114*, 3565-3566.
18. Kesti, M. R.; Coates, G.W.; Waymouth, R.M. "Homogeneous Ziegler-Natta Polymerization of Functionalized Monomers Catalyzed by Cationic Group IV Metallocenes" *J. Am. Chem. Soc.*, **1992**, *114*, 9679-9680.
19. Coates, G. W.; Waymouth, R.M. "Chiral Polymers via Cyclopolymerization" *J. Mol. Catal.*, **1992**, *76*, 189-194.
20. Wischmeyer, U.; Knight, K.S.; Waymouth, R.M. "Stereoselective Cyclomagnesiumation of 1,6-Heptadienes Catalyzed by Zirconocenes: Effects of Substituents, Solvent and Magnesium Reagent" *Tetrahedron Letters*, **1992**, *33*, 7735-7738.

21. Coates, G.W.; Waymouth, R. M. "Enantioselective Cyclopolymerization of 1,5-Hexadiene Catalyzed by Chiral Zirconocenes: A Novel Strategy for the Synthesis of Optically Active Polymers with Chirality in the Main Chain." *J. Am. Chem. Soc.*, **1993**, *115*, 91-98.
22. Cavallo, L.; Guerra, G.; Corradini, P.; Resconi, L.; Waymouth, R.M. "Model Catalytic Sites for Olefin Polymerization and Diastereoselectivity in the Cyclopolymerization of 1,5-Hexadiene" *Macromolecules*, **1993**, *26*, 260-267.
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27. Mogstad, A.; Waymouth, R.M. "Synthesis of Diblock Polyolefin and Polyester Copolymers Using Zirconium and Aluminum Catalysts" *Macromolecules* **1994**, *27*, 2313-2315.
28. Knight, K.S.; Waymouth, R.M. "Stereoselective Cyclization via Zirconocene-Catalyzed Intramolecular Olefin Allylation" *Organometallics*, **1994**, *13*, 2575-2577.
29. Hsiao, Y.-L.; Waymouth, R.M. "Free-Radical Hydrosilylation of Poly(phenylsilane): Synthesis of Functionalized Polysilanes", *J. Am. Chem. Soc.*, **1994**, *116*, 9779-9780.
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31. Coates, G.W.; Waymouth, R.M. "Oscillating Stereocontrol in the Polymerization of Propylene: A New Strategy for the Synthesis of Thermoplastic Elastomeric Polypropylene" *Science*, **1995**, *267*, 217-218.
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35. Coates, G.W.; Waymouth, R.M. "Homogeneous Ziegler-Natta Catalysis" in *Comprehensive Organometallic Chemistry II*, Abel, E. W.; Stone, F. G. A.; Wilkinson, G.; Eds., vol. 12, Pergamon, New York: **1995**, Chapter 12.1, p. 1193-1208.
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38. Hauptman, E.; Waymouth, R. M.; Ziller, J. "Stereoblock Polypropylene: Ligand Effects on the Stereospecificity of 2-Arylindene Zirconocene Catalysts", *J. Am. Chem. Soc.* **1995**, *117*, 11586-11587.
39. Beach, James V.; Loy, Douglas A.; Hsiao, Y-L.; Waymouth, R.M. "Environmentally Friendly Polysilane Photoresists" in *Microelectronics Technology*, Reichmanis, E.; Ober, C.; MacDonald,

- S.A.; Iwayanagi, T.; Nishikubo, T; Eds.; ACS Symposium Series 614; American Chemical Society; Washington DC, **1995**, Chapter 23, p. 355-366.
40. Ciardelli, F.; Aglietto, M.; Pieroni, O.; Ruggeri, G.; Waymouth, R. M.; Kesti, M.; Stein, K. "Synthetic Approaches to Functional Polymers" in "Organic Synthesis: Gnosis to Prognosis", Kluwer, The Netherlands, **1996**, p 525-548.
  41. Waymouth, R. M.; Coates, G.W.; Ciardelli, F.; Carlini, C.; Altomare, A. "Polymer Synthesis and Stereochemistry with Transition Metal Catalysts" in "Organic Synthesis: Gnosis to Prognosis", Kluwer, The Netherlands, **1996**, p 453-473.
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  43. Sernetz, F. G.; Mulhaupt, R.; Waymouth, R. M. "Influence of polymerization conditions on the copolymerization of styrene with ethylene using Me<sub>2</sub>Si(Me<sub>4</sub>Cp)(N-tert-butyl)TiCl<sub>2</sub>/methylalumoxane Ziegler-Natta catalysts" *Macromol. Chem. Phys.* **1996**, *197*, 1071-1083.
  44. Shaughnessy, K. H., Waymouth, R. M. "A Regioselective Cyclo-carboxylation of Non-conjugated Dienes to Cyclic Ketoesters" *Organometallics*, **1997**, *16*, 1001-1007.
  45. Millward, D.B.; Waymouth, R. M. "Zirconocene-Mediated Cyclization of 2-Bromo- $\alpha,\omega$ -Dienes" *Organometallics*, **1997**, *16*, 1153-1158.
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  48. Kravchenko, R.; Masood, A.; Waymouth, R. M. "Propylene Polymerization with Chiral and Achiral Unbridged 2-Arylindene Metallocenes" *Organometallics*, **1997**, *16*, 3635-3639.
  49. Bruce, M.D.; Coates, G.W.; Hauptman, E.; Waymouth, R. M. "The Effect of Metal on the Stereospecificity of 2-Arylindene Catalysts for Elastomeric Polypropylene", *J. Am. Chem. Soc.* **1997** *119*, 11174-11182.
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  51. Stehling, U. M.; Stein, K. M.; Waymouth, R. M. "Metallocene/Borate Catalyzed Polymerization of Amino Functionalized  $\alpha$ -Olefins" *Macromolecules*, **1998**, *31*, 2019-2027.
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  56. Stehling, U. M.; Malmstrom, E. E.; Waymouth, R. M.; Hawker, C. J. "Synthesis of Poly(olefin) Graft Copolymers by a Combination of Metallocene and 'Living' Free Radical Polymerization" *Macromolecules*, **1998**, *31*, 4396-4398.
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58. Lin, S. Hauptman, E.; Lal, T. K.; Waymouth, R.M., Quan, R. W.; Ernst, A.B. "Steric and Electronic Effects of R in (2-(4-R-C<sub>6</sub>H<sub>4</sub>)indenyl)<sub>2</sub>ZrCl<sub>2</sub> Catalysts on the Synthesis of Elastomeric Polypropylene" *J. Mol. Catal. A.*, **1998**, *136*, 23-33.
59. McKnight, A. L.; Waymouth, R. M. "Group 4 Ansa-Cyclopentadienyl-Amido Catalysts for Olefin Polymerization", *Chem. Rev.*, **1998**, *98*, 2587-2598.
60. Hu, Y.; Krejchi, M. T.; Shah, C. D. Waymouth, R. M.; Myers, C. L. "Elastomeric Polypropylenes from Unbridged 2-Phenylindene Zirconocene Catalysts: Thermal Characterizations and Mechanical Properties" *Macromolecules*, **1998**, *31*, 6908-6916.
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