

DESIGN OF OLEFIN METATHESIS CATALYSTS:
FROM ENANTIOSELECTIVE REACTIONS TO TETRASUBSTITUTED OLEFINS

Thesis by
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In Partial Fulfillment of the Requirements
for the Degree of
Doctor of Philosophy

California Institute of Technology

Pasadena, California

2007

(Defended November 20, 2006)

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Acknowledgments

Which is harder, writing a thesis or finding the time to thank everyone who helped make it possible? I'm not sure, but I'm sure I'll find out. I am extremely grateful to my family who have been my biggest supporters from day one. Their love, advice and excellent taste in vacations has helped make the last 5 years so much fun. I would also like to thank my beautiful girlfriend Meghana. I'm not even sure what grad school would have been like without her. It certainly wouldn't have been as much fun. She's been my best friend almost from the day we met. A special thanks to our current third roommate, Artemis, for helping to keep us both sane while writing our theses.

Someone told me when I got to Caltech that by the end of graduate school you couldn't imagine having worked in a different research group than the one you worked in. Although I can't remember who said that, he or she must have worked in the Grubbs labs. I truly can't think of a better place to have done research over the last 5 years. Bob allowed me the creative freedom that made my work here so enjoyable and was a thoughtful mentor throughout. Moreover, he is a fine chef both in the mountains of Yosemite and his backyard. On top of all that, every member of the Grubbs' family has been more welcoming than I ever imagined; although, I think I still have a bruise or two from playing pool basketball with Brendan. I would especially like to thank Helen, Brendan, Katie, and Barney. Oops, I guess that is all of them! I would also like to thank my outside thesis committee members, Brian Stoltz, Dennis Dougherty, and Dave Tirrell for all of their help in completing the graduation process.

I have had the privilege to work with a number of very talented co-workers in my time in 130 Church (proud distributor of fine CDs). At the beginning of my time, Dean

and Justin provided helpful discussion, advice, and inspirational demonstrations of 40 thieves. Steve Goldberg deserves a special mention for truly getting me started. Steve worked with me and endured innumerable questions. He is one of the nicest, smartest, goofiest guys you could ever meet, and he is terrible at fantasy baseball. Towards the end of my time here at Caltech, a new crew arrived in 130 Church: Anna, Jean, Tobias, Patricio, Daryl, Joseph, and Ian. They have all been tremendously helpful. A special thanks goes to Ian for scientific discussions. Thanks to Irina who has been in 130 for much of my time and endured my way too loud music in the middle of the night. I have also had the pleasure of working with a talented undergrad, Jane Wang. She is also graduating this year, and I look forward to crossing paths with her again in the future. A special thanks goes to my two classmates, Andy and Tim, who worked in 130 Church just about as long as I did. In addition to being great friends, their scientific input has been invaluable. There are a few other members of the Grubbs lab I would like to single out and thank: Erin, John (Beef), Drew, Chris, Christie, Dan, Greg, Soon, Kevin, and Jen.

I've also had a lot of fun outside lab. I'd like to give a special shout-out to Imperial Palace, Softball champions 2006 – Caltech A league and JPL all three seasons. We've had a bunch of players throughout the years, but a few have been there pretty much the whole time: Tim, Nick, Andy, Jeremy, Rob, Harmony, Amy, and Mollner. It wouldn't have been nearly as much fun without Ted, Mohan, Julian, Daryl, Diane, Matt, Louis, and Ken. I'd be remiss if I didn't thank our ringers, Big Mike and Johnny & Co. Special thanks to my surfing partner, Tim. Also, thanks to Nick my best friend out here whom I'm not dating and my roommate for 4 years. I'm definitely going to miss football breakfast once I'm back on the east coast. Oh, I give up. It's been a lot of fun, from

overpriced bad dinners with Eimear, to Vegas trips with everyone, to teaching Meghana to ski, to carving pumpkins with Erin, and so much more. I really want to thank all of my friends for making this time so fun. I feel like I'm writing a high school yearbook entry, but grad school wouldn't have been the same without my awesome friends. San Dimas High School Football Rules!

Abstract

The widespread use of olefin metathesis in organic and polymer chemistry has been due in large part to the emergence of highly active stable ruthenium catalysts for this transformation. To date, the most successful catalysts for asymmetric olefin metathesis reactions are molybdenum based. It is expected that the development of more effective ruthenium-based catalysts for asymmetric olefin metathesis reactions will dramatically expand the synthetic utility of these reactions. Chapter 2 of this thesis describes the synthesis of novel chiral ruthenium-based olefin metathesis catalysts. These catalysts are applied to asymmetric ring-closing metathesis in chapter 3 and asymmetric ring-opening cross metathesis along with the first examples of asymmetric cross metathesis in chapter 4.

Another area in which the use of ruthenium-based catalysts is limited is the preparation of very sterically encumbered olefins. One example of this limitation is ring-closing metathesis to form tetrasubstituted olefins, chapter 5 describes the synthesis of a family of ruthenium-based catalysts that demonstrate improved activity for this transformation.

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