**SCANNED**
JUN 28 2011

# BRUCE M. NOVAK

PTG

**Office**
Department of Chemistry
North Carolina State University
Raleigh, North Carolina 27695
1-919-515-2996, 1-919-513-2828 (fax)
bruce_novak@ncsu.edu

**Home**
933 Rand Rd
Garner, North Carolina 27529
1-919-661-6489

## EDUCATION

- Ph.D. Organic Chemistry, May 1989, California Institute of Technology,
  Thesis: Aqueous Ring-Opening Metathesis Polymerizations
  (Advisor: Professor Robert H. Grubbs)
- M. S. Chemistry, May 1985, California State University, Northridge
  Thesis: The Synthesis and Reactivity of a Skeletally Chiral Metal Cluster, (Advisor: Professor Edward Rosenberg)
- B. S. Chemistry, January 1983, Summa Cum Laude,
  California State University, Northridge

## RELATED EMPLOYMENT AND RESEARCH EXPERIENCE

- Howard J. Schaeffer Distinguished University Professor, North Carolina State University, June 1998 - Present
- Head, Department of Chemistry, North Carolina State University, September 1998 – July 2004
- Director, Multidisciplinary Center for Polymer Synthesis and Characterization, NCSU, 1999 - 2005
- Professor, Department of Polymer Science and Engineering, University of Massachusetts, Amherst, 1997 - 1998
- Associate Professor, Department of Polymer Science and Engineering, University of Massachusetts, Amherst, 1993 - 1997
- Visiting Professor, Universite' de Louvain, Louvain-la-Neuve, Belgium, Spring 1997
- Turner Alfrey Visiting Professor, Michigan Molecular Institute, Spring 1998
- Director, Polymer Catalysis Laboratory, University of Massachusetts, Amherst, June 1993 - June 1998
- Assistant Professor, Department of Chemistry, UC Berkeley, June 1989 - May 1993
- Faculty Associate Scientist, Materials and Chemical Sciences Division, Lawrence Berkeley Laboratory, June 1989 - 1997
- Visiting Scientist, ICI Materials Research Centre, Teesside, England; 1988
- Member, Dow Chemical Technical Advisory Board, 1997 - 2001

## AWARDS, HONORS AND PROFESSIONAL SOCIETIES

- Inaugural Fellow, ACS Polymer Division 2010
- Alumni Outstanding University Teaching Professor 2008
- Turner Alfrey Visiting Professorship, 1997-98
- ACS, Carl S. Marvel Creative Polymer Chemistry Award, 1997
- National Science Foundation Presidential Faculty Fellow, 1993 - 1998
- National Science Foundation Presidential Young Investigator, 1991 - 1996
- Alfred P. Sloan Research Fellow, 1991-1992
- Du Pont Young Faculty Award, 1992-1994

- Lawrence Berkeley Laboratory Young Investigator Award, 1991
- Innovation Recognition Award, Union Carbide, 1993 and 1994
- DuPont Young Investigator Award, 1991
- DuPont Young Investigator Award, 1989
- Rohm and Haas Summer Faculty Fellowship, 1992
- 3M Nontenured Faculty Award, 1992
- Herbert H. McCoy Award, Caltech, 1989
- Sherwin-Williams/American Chemical Society, PMSE Student Award in Polymer Science, 1987
- President's Club, Outstanding Masters Candidate, 1985
- Outstanding Teaching Assistant, CSUN, 1983-1984
- Chancellor's Distinguished Scholarship Award, 1980
- Phi Kappa Phi Honor Society
- Alpha Gamma Sigma Honor Society
- Phi Lambda Upsilon, Chemistry Honor Society
- Sigma Xi, Scientific Research Society

## PROFESSIONAL ACTIVITIES

- Associate Editor, *Macromolecules,* 1995-Present
- Editorial Advisory Board, *Polymer International*
- Editorial Advisory Board, *Journal of Polymer Science, Polymer Chemistry*
- Editorial Board, *Polymer Bulletin*
- Editorial Board, *Acta Polymerica*
- Editorial Board, *Current Opinion in Solid State & Materials Science*
- Associate Member, Systematic Nomenclature and Structure Representation Division, *International Union of Pure and Applied Chemistry,* 2001
- Organizer, Joint US-Japan Symposium on Inorganic-Organic Hybrid Materials, 1994
- Organizer, ACS Workshop on Inorganic-Organic Hybrid Materials, 1995
- Organizer, ACS Workshop on Controlled Polymer Architectures, 2000
- Organizer, Joint US-Germany Workshop on Polymer Chemistry and Physics, 1996
- Symposium Organizer, American Chemical Society National Meeting, Anaheim, 1998
- Symposium Organizer, American Chemical Society National Meeting, Chicago, 1993
- Symposium Organizer, American Chemical Society National Meeting, SF, 1992.
- Organizer, Southeastern Chemistry Chairs Meeting, Spring 2001

## FELLOWSHIPS

- Organic Chemistry Division, American Chemical Society, 1988 - 1889
- IBM Graduate Research Fellowship, 1987 - 1988

## MILITARY SERVICE

- Sergeant, U. S. Army Airborne, 1973 – 1977

Bruce M. Novak
NC State

**Administration, Teaching and Research Information**

## I. Administration and Leadership

> "...who knows the great enthusiasms, the great devotions, and spends himself in a worthy cause;..." T. Roosevelt

As an educator, I cannot imagine a more professionally gratifying accomplishment than to be part of a team that elevates an institution to greatness: "to spend myself" in this pursuit. I have experienced nurturing success at the department level and I am now anxious to tackle challenges faced at the college level. I believe strongly in the greatness of the American higher education system and am committed to enhancing the excellence of my institution be it University of Texas, Dallas, or elsewhere. Bringing diverse, ambitious groups together in constructive, innovative and productive ways is essential to my own and an institution's success. I have served on both engineering and science faculties, and hence, I am familiar with the nuances of different academic cultures. An overarching goal of mine is to be a part of an academic community that is multidisciplinary, principle-centered, and working in concert for the mutual benefit of all.

### I.A. Personal Background

My leadership skills were first developed as a sergeant in the US Army Airborne. It was there that I learned to make tough, decisive decisions under pressure and the importance of teamwork. Although an authoritarian style is not generally suited to an academic setting, it can be surprisingly effective at times. I later refined my leadership skills vis-à-vis the importance of buy-in and building consensus while serving as Department Head of Chemistry at North Carolina State University for 6 years from 1998 to 2004. Interested in exploring the administrative side of academics, I moved from the Polymer Science and Engineering Department at the University of Massachusetts to NC State to assume the Head position. This was a challenging opportunity, but one I perceived having many of the crucial elements present or obtainable, that when knitted together, would lead to success.

In 1998, the Chemistry Department at NC State was not particularly strong. It was established as a service department in the early 1960's and the department was sized accordingly. As chartered, faculty strongly emphasized teaching over research and the teaching loads were heavy. In the late 1980's the university, recognizing the importance of a strong, Research I (now "Research Intensive") chemistry department, committed to the development of the department. Janet Osteryoung was brought in to lead this effort, however, she left after a few years to take over as the Director of the Chemistry Division at NSF. The department leadership was then turned over to a senior faculty member, and after a protracted search, I was hired to oversee the advancement process.

In the following discussion of accomplishments, I want to emphasize that the results emanated from the hard work of dedicated faculty that functioned as a team, and I will not usurp their credit. By 1998, the growth of the department was stalled: of the 31 tenure track faculty, less than half were research active (13), and nearly that number were

nearing retirement (unfortunately, close but not quite, a null set). A less than collegial atmosphere permeated the department. The staff was demoralized. The shared facilities were equipped with dated instrumentation. The 30 year old chemistry building was greatly undersized and in need of immediate renovation. The graduate student population was small and comprised of a distribution of students characterized by a low mean. The undergraduate curriculum was badly in need of reform. You know, a typically average chemistry department in an under funded state institution.

In tackling these issues, I sought to develop a team attitude in the department, where everyone felt like part of the solution and worked toward the common goals. The first day on the job, I drafted a mission statement and circulated it among the faculty and staff for discussion and modification. The process had begun. In many ways, I believe we were very successful. Again, I did not institute these changes alone, they resulted from the hard work of a dedicated faculty and staff possessing a common purpose. My role was to create the atmosphere in which the team members wanted to participate in the fullest. Indicators of our success include:

- Elevation in the national rankings (e.g., US News & World Report ranking of graduate programs) from the 1998 ranking of 76th to the 2002 ranking of 51st. This was the largest jump of any of the 200 departments surveyed.[1] (See:
- Breaking into the top 50 departments in external funding, ranking 43rd in the nation in chemical R&D spending. This is up from our ranking of 73 in 1999. The percent increase since 1990 was 21.6% and this represents the largest single increase for any university in the country. The national average growth rate for the same period was only 4.0%.[2]
- Paralleling this, the department had a greater increase in federal funding over the last 10 years than any other chemistry department in the nation.[3]
- Increases in research space: New Chemistry Research Building, Partners III, for our Nanotechnology focused groups. New undergraduate teaching laboratory was funded and completed. (Planning, however, for this laboratory started before my arrival.)
- Secured funds for full renovation of approximately 10,000 sq. ft. of wet laboratory space in the old chemistry building.
- Increase in the graduate student population from 78 in 1998 to 126 in 2004. (Accomplished while both raising standards and not exceeding 22% foreign students.)
- The hiring of 11 new tenure track faculty members with competitive salaries, startup funds and renovated research space.
- Instituted a number of programs to improve diversity of both the faculty and student body. (Of the 20 faculty hires, including non-tenure track lecturers during my tenure, 8 were female (40%), 2 Hispanic (10%) and 2

---

[1] *US News & World Report*, Spring, 2002.

[2] *Chemical & Engineering News*, October 28, 2002.

[3] *Chemical & Engineering News*, July 21, 2003.

African American (10%). In tenure track positions 27% were female, 9% African American, and 9% Hispanic.)

- Upgraded via NSF and NIH funding the X-ray, magnetic and NMR shared facilities. Purchases include three new NMR's, 600, and two 400 MHz instruments, a SQUID magnetometer, and a CCD detection X-ray diffractometer.
- Instituted a full undergraduate curriculum review and oversaw implementation of the suggested restructuring.
- Improved department esprit de corps by initiating activities such as social functions, team building exercises (workshops and retreats), staff appreciation events, and improved communications (faculty forums, etc.).

I stress leadership here because as a Chaired Professor I have an obligation to my junior colleagues to lead by example.

## II. Teaching

Probably my greatest strength in the three important areas of administration, research and teaching, is teaching. Many of my most satisfying professional moments are in the classroom. I am an organic chemist specializing in polymer science. Hence, in addition to all introductory courses, I can teach within the organic curriculum at all levels, and special topics courses in polymer science. My personal preference right now is the sophomore organic I and II sequence. This is driven primarily by my passion for exposing students for the first time to some of the most interesting and relevant science taught. (Clearly I'm biased.) Secondarily, I think there is a perceived benefit (rightly or wrongly) to having chaired professors teach in the lower level courses. The students certainly notice and respond to it and it can be used as good public relations.

I emphasize bring relevance to the classroom and the topic. Chemistry is central to the important technological themes of the coming decades (e.g., biotechnology, advanced materials, etc.). Given the moral, ethical and legal questions that the next generations will face, we need a population that is literate in the sciences. Did you know that about 20% of the US adult population believes that the sun revolves around the earth? This is a sadly true and unacceptable statistic that must be changed and I am dedicated to this pursuit.

Included as Appendix A is a selection of comments from my student evaluations at the conclusion of sophomore organic chemistry courses.

## III. Research

My polymer program currently encompasses projects concentrated in several major areas in materials chemistry: macromolecular chirality, the synthesis of organic-inorganic hybrid materials that display mixing near the molecular level; the design of organometallic complexes for use in living polymerizations; the development of transition metal catalysts for the polymerization of functional olefins; the catalytic formation and polymerization of thermodynamically unstable monomers; and the development of photoactive materials for applications ranging from photolithography,

reversible molecular switching, and the generation and modulation of color using liquid crystalline materials.

Central to the themes of nanotechnology and advanced materials is the control of molecular architecture at a variety of length scales. In advancing polymer chemistry, we work on developing new living polymerization techniques that allow the best control over molecular weight, molecular weight distributions, and endgroup identity. A successful approach has been to promote non-living classical polymerizations (free radical, anionic, cationic) to living status by modulating the propagating group using transition metal catalysts. The covalent transition metal-carbon offers greater flexibility and control than their counterpart organic intermediates.

As a sub-theme, we are interested in studying macromolecules capable of displaying high degrees of order both in an intra- and intra-molecular fashion. A motif particularly well suited for these studies is the helix. Helical polymers, with their intrinsic chirality, have a wide range of applicability that includes optical devices (lasers, displays, reversible information storage, nonlinear optics, selective diffraction gratings, holographic storage, optical switches), piezoelectric materials, electromechanical actuators, pyroelectric materials, ferroelectric materials, chiral separations and sensors (chiral separation media, amplified chemical sensors), asymmetric catalysis (chiral supports, shape-persistent templates, enantioselective reactions) and finally, biomimetic polymers (artificial proteins, ion channels, controlled drug delivery, antibacterial/viral agents). Recently, we have designed homochiral catalysts that selectively form a left- or right-handed helix from achiral monomers. This has become a platform that now allows us to develop new projects in the areas highlighted above.

My research over the years has been supported by NSF, ONR, DOE, Petroleum Research Fund, Alfred P. Sloan Foundation, 3M, DuPont, Dow, Procter & Gamble, Duke Energy, Revlon, BFGoodrich, Seksui, JSR, Mitsubishi Rayon, Toyota, Shin-Itsu, BASF, National Starch, Vector Ltd., IBM, Bell Labs (now Lucent), Union Carbide, SIR, Amoco, Chevron, Monsanto, Markem, TORAY, Teijin, Sumitomo, Exxon and Unitika.

**Current Funding:**

NSF, STTR, "Inhibition of Biofilms on Polymer Surfaces" Phase I (all milestones met) $150,000, 2009-10 (with Co-PI, C. Melander and Agile Inc. as the industrial partner). Phase II is due for submission December 2010.

Unrestricted Funding From Industry:

$92,000/year Promerus
$45,000/year SRI
$20,000/year Agile

**Appendix A: Student Evaluations**

**First, it appears that several students (future giving alumni) are worried that I don't make enough money:**

> "Novak deserves a bigger office, *more money*, [emphasis added] and a building named for him on campus."
>
> *Dr. Novak is the best professor at NCSU.* I've never had a teacher care so much about his students and devote so much of their time to helping students master the material. Plus, not only is he *a genius* on the subject he is a human being meaning no matter what a student may ask he NEVER makes them feel dumb or inadequate in the subject. I have had a terrible organic 1 professor and I thought that I would never be able to pick up on a subject like this, but *with Dr. Novak's help I have developed a love for organic chemistry* and I'm no longer scared of this subject. *So basically he's amazing and NCSU should give him a raise.*
>
> "*Dr. Novak is probably the best teacher I've ever had.* It really is amazing to see just how dedicated he is to teaching and just how good he is at it. *I'm proud to have been a student of his* for two semester now. *Give the man a raise.*"
>
> "*Dr. Novak is the man*, give him a medal [e.g., a big fat pay raise] for trying so so so hard to make extra material to simplify topics and work with students *A+++ Professor.*"

**Then there are some that like me but don't care about my pay scale:**

"Great Professor. I loved his class. It was entertaining and his teaching was very effective. Always available for questions and learning outside the classroom. *Dr. Novak is probably the most effective professor I've ever had.*"

"*I have never seen a teacher work a lecture room the way he does.* He can keep people awake while teaching in fairly simple terms. He knows an amazing number of the students by name and takes time to talk with them and help them through in any way he can. He personalizes organic chemistry and it's amazing!"

"Novak you are the most AWESOME teacher I've ever had!!!! You really care about us learning the material, and the office hours you hold are SOOO helpful. I can't say enough to let you know that *you are the best teacher I have ever had in my life* [Emphasis added] and I'm sorry that I won't be able to have you teach another one of my classes again.

"*Dr. Novak is honestly my hero.* Not only is he the best teacher I've ever had, he is an amazing person. I hope that when I am his age I am as successful and HAPPY as he is. I cannot believe his dedication. No other teacher I know of will hold as many office hours as he does. It is obvious that he wants all of his students to be very successful because he puts so much time into making problem sets, readings, sending out emails, and office hours. *If all of my teachers were as good as Dr. Novak, this University would have an IVY League reputation.*"

"*This is the best teacher I have ever had.*"

"*Greatest teacher I've ever had.*"

"*Best teacher I've ever had.*"

"*Dr. Novak is an Amazing professor.*"

"*He is by far the best chemistry teacher I have ever had.* I have never had a teacher that put so much effort into making sure that all students understood what was being taught."

"*The greatest professor EVER!*"

Dr. Novak is a very terrific professor, he is so enthusiastic about his teaching, he spends most of his time to his student, anytime we have question(s) he return his response to us promptly. Tried his best to let us understand the difficult stuff. ANYWAY, HE IS THE PROFESSOR IN ORGANIC CHEMISTRY. NO ONE CAN REPLACE HIM! EXCELLENT.

Very good professor. Wonderful. Outstanding. I learned a lot and I shall never forget it. There aren't enough positive adjectives to describe him.

This instructor seemed to pour so much of his life into helping students learn. Have never seen such a dedicated instructor in my life. Although I will fail the course, the instructor couldn't have done a better job in equipping me the knowledge I needed in order to do well.

Extremely good teacher. It is very rare to get the one on one feel in such a large class. By far the best Professor, teaching and personality, that I have had in 5 years of college.

Dr. Novak = best professor ever!!!!

This was one of the greatest classes I have ever had the privileged of attending. Thanks

All instructors should take a course in effective teaching from Dr. Novak. His passion for organic makes it enjoyable and exciting. Although he is one of most distinguished professors, he is also one of the most modest. He is extremely dedicated. His worksheets and office hours make learning one of the hardest subjects in college...easy. His tests are challenging, yet doable. Everyone should have the opportunity to be taught by him.

Novak is a phenomenal teacher. He explains things very clearly and makes this very tough course understandable. He goes above and beyond for the students, he has multiple office hours and is always available for questions and guidance. I've have never had a teacher that is so excited about the material and available to the students. He may be the best teacher ever....honestly...I'm serious! Give the man a raise.

Dr. Novak is an incredible teacher. Such a huge change from my experience in Organic I, his enthuiasm for chemistry is overshadowed only by his desire to see us succeed at it and enjoy it for ourselves. The massive amount of time he has

spent helping students outside of class exemplifies this perfectly. This is how courses should be taught.

Dr. Novak made a subject I hate an enjoyabvle experience. He was able to earn my respect by taking time to get to know me and was able to increase my knowledge of Orgo.

I love Dr. Novak. He is an awesome teacher. He is difficult but fair. He is always enthusiastic about class and never gives up on anyone.

I loved Doctor Novak. I have never had a more enjoyable teacher that's made me want to come to class.

I really like organic chemistry. An excellent follow up to the first class.

Novak is amazing!!!!! Best teacher I have ever had!!!!!!

Dr. Novak is the best professor I have ever had. He made a challenging course into a fun and even entertaining experience. He taught us Organic chem as a way of thinking so that our intuition would guide us to the ansdwer even if we weren't sure about the question.

We rely heavily on student evaluations to judge the teaching effectiveness of our faculty. After being back into the teaching ranks I would like to try and dispel a couple of myths: 1) The only way to get good teaching evaluations is to teach a soft class and inflate grades; and 2) if taught right, we can attract students into chemistry.

**Chemistry is beautiful, and taught correctly, students understand the beauty and actually like the subject.**

"Dr. Novak is without a doubt one of the best instructors I have ever had. He is very good at explaining what some would say is one of the most difficult subjects they will take, and he is very accessible to students who need additional help. His tests are very difficult, but he goes out of his way to provide far more (useful) study materials than most professors would. *I will miss his class.*"

*I am going to be sad to not have organic.*

"*Best professor I have ever had.* Reseptive to student's, brilliant teaching style, consistent. *I loved this course and I probably wouldn't have if was not for Dr. Novak.*"

From a C Student: "I really enjoyed having you as a professor, and I'm really going to miss class (did I just say that?!!?) haha. Thanks for all time you spent with us during office hours, they are truly life savers.

**From a C Student:** "I was in both of your organic classes this year, organic 1 in the fall, and this semester organic 2. I would just like to say thank you for making class educational as well as entertaining. It was the one class I

looked forward to going to and never missed a day. I also appreciated you taking time to help the students in your class. Those review sessions before the test, were a big help. Keep up the good work!

**From an F Student:** "I would like to say thank you for a great year in organic 1 and 2. Not only did you manage to make the notoriously most loathed class in college understandable, you made it rather enjoyable." (Also cited above.)

**From a B Student:** I wanted to talk to you after the exam on Monday, but you were busy answering questions and I didn't want to be any more of a distraction to people in the class. Anyhow, I want to thank you for an awesome year...I really had a blast and you made organic fun and enjoyable and now I love it:) I will definitely miss your class next year, but I will have to visit...definitely. Well, I just wanted to say thanks and have a great summer...I heard you were teaching organic this summer, so have fun with that and I will most definitely see you next year!!!

**From a B Student:** Thank you for being so amazing these two semesters. I really enjoyed taking organic chemistry with you and I have learned a lot. You are so enthusiastic and crazy that you make organic so much fun. I will keep in touch with you (no matter if you want to or not :D) Thank you for putting so much effort to make us succeed. Hope that you will have a great summer and I will see you sometime soon!

**From a B Student:** Thank you for all of your help and guidance during the semester and on the final. I really enjoyed your class...even though it was organic. I'm glad all those office hrs and studying finally paid off : ) Have a good summer!!! Wish me luck in biochem! Thanks again.

**From an A Student:** Not many teachers would do the things you do. It was awesome being in your class. Hands down you are my favorite teacher and Organic Chemistry is now my favorite subject, just like you said at the beginning of last year. Thanks for being such a great teacher and person and thanks for all you have done for me and all your other students. We really appreciate all the time and effort you put into your class and especially your study guides and office hours. Again thanks for everything you do and trust me I won't be a stranger.

**Maintain Standards and Teach a Rigorous Course:**

"*For those hungry to learn, this course is the one for them.* [Emphasis added] The only weakness is that it in comparison to most other courses at NC State, this is on too high of a level for many students who are not use to working as hard for their grade. I really believe though that this isn't a weakness and that every other course, especially related to science needs to kick it up a little bit. *And any student that can't keep up, is not meant to be in this program or here at all.*" [He/she said it, not me]

"Dr. Novak is probably the best professor at NC State. He really cares about his students and will do anything to make sure they will succeed. *His tests are really difficult but he offers lots of help make sure students will be prepared.* You really have to put in extra effort to perform well in his class. He treats students fairly and is passionate about organic chemistry. *He makes a really challenging subject fun and interesting to learn about.* I wish there were more teachers like Dr. Novak.

"Dr. Novak is an incredible professor. He is completely devoted to the student's understanding the material, and is enthusiastic and encouraging toward their success. I am so grateful to have had a professor like him at this university. *He has made organic chemistry manageable and exciting, and although it is difficult, it was the easiest class to study for and to know what is expected of us.*"

"*The course material is very difficult, but Dr. Novak does an amazing job getting everyone to understand it.*"

"*Dr. Novak handle this course very well, difficult become easy, boring become interesting.*"

"*Material was difficult, but he made it very worth while and enjoyable.*"

"*Hard course but he made it easy...*"

**Positive Evaluations do not only come from successful students.** What the students want most is to have someone care about them and their progress. Being a good, inspiring teacher is about caring and dedication to the students, not about grades. Here are some comments I collected at the end of the year:

**From a D Student:** "Thank you so much! Contrary to my exam grades, I really feel like I learned something in your class. I also learned a whole new level of pre-exam stress! But, I feel like it really helped me understand things that I couldn't before. A little fire under the ass will really help sometimes I think. But it really means a lot to me that you were willing to understand my situation. I was wise to listen to the opinions of every single former student of yours!"

**From an F Student:** "I would like to say thank you for a great year in organic 1 and 2. Not only did you manage to make the notoriously most loathed class in college understandable, you made it rather enjoyable."

**From an C- Student:** I just wanted to let you know how much I appreciated your help in the past year in organic 221 and 223. I have never had a teacher go out of their way or seem to care about their students as much as you have. The final exam got me a little, I didn't feel like the stuff I studied helped me at all. I studied for it but it just seems like there is just one little thing that is stopping me from understanding the big picture. I just wanted to say thanks again.

**From a D Student:** "I wanted to thank you again for an awesome semester. I have never had a professor place so much of his time into making sure

students learn. Your time and patience was (and is) greatly appreciated. Thank you again Dr. Novak!

**From a C Student:** "Hey prof., I was just wanting to thank you for making my freshmen year a great one, and setting super high standards for all the professors that I have down the road. I wish that you could teach every class that I ever have to take, as you are the best teacher that I have ever had. I appreciate all the time and effort that you put in to helping your students achieve as much as they can if they are willing to try as well. I hope that you don't think that I'm trying to suck up for extra points or something, I just wanted to let you know that you are completely awesome and no matter how much you make you deserve a raise! [Please take special note and don't let this student down.] I hope that you have a good summer and that i can possibly hang out with you in your office some time next semester if you are not busy, just to shoot the breeze a little bit.

**From an A Student:** "Thanks for being a great professor this semester. I wish all of my professors had a teaching style similar to yours - serious but sincere.

**From a B Student:** I just wanted to thank you for the semester, I really enjoyed your class and how you taught it. I hope you have a great summer, and if you do leave to go to another university, I wish you the best of luck, but we will miss you here and it will not be the same without you.

**From a C Student**: I just forgot to stop by after the final and say thank you. I really appreciate that you really cared for each students to understand and learn organic chemistry more in depth. Thank you for your time and effort on teach us and taught us your great knowledge of organic chemistry. (You Rock!)

**From a C Student:** Hey Dr. Novak! I just wanted to thank you for all your help over the past 2 semesters I have had you. You are an amazing teacher and I will most certainly miss having you teach my other chemistry classes. You really did a lot for our class by having all the extra office hours where you could have been spending your time doing something else. I have never met a teacher that was more dedicated to their students. So thanks again and I will try to stop by and visit every now and then!

**From a C- Student:** "Thank you for being a wonderful professor and making this class one of the most challenging and fulfilling I've taken. You've truly gone above and beyond to help your students. I don't know that I could have passed with another professor. I certainly would have spent much more time and frustration!

**From a C Student:** Its been an awesome organic experience with you. I didn't get to say thanks after the final, So thanks a lot for the semester. Hope all is well.

**Unknown Grade:** "I wanted to thank you for a great semester and for great experience in your class! You are the best professor ever!"

**Unknown Grade:** "I want to thank you for being a truly remarkable professor. Finishing this semester of CH 223 was exciting, but also sad because I will miss having a class with you. I hope it makes you feel good to know that all of your students love you! :)"

**From a C Student:** Thanks for all of your help on the final and throughout the semester. You are by far, one of the most dedicated professors/teachers I have ever had. Thanks so much! Have a good summer.

**From a C Student:** I appreciate all your hard work in trying to prepare me for your tests. I'm sure you must have thought they were easy enough and that you intended to separate the A's & B's from the rest of the class. I can appreciate that. I honestly tried and can say without doubt that I did not struggle as badly this semester with you as I did last semester with another instructor who I really didn't think gave a flyin' flip about me or the rest of the class. I always felt like he had his own agenda other than teaching... Regardless, thanks again for trying to always put us first. I barely remember anything from Org I, but I really learned a lot in your class (even if I had difficulty applying it). You made everything relevant and that helped - well, so does your organization in notes.

I just don't know how else to say thanks and that I really appreciate you. I hope you have a great summer.

P.S. Remember: I got nuthin but luv for the brotha dat put me in da game, 4 real.

If I eva hear any body put my ChemDaddy down, me and
the homies (all A students, plus Marlena)
will be hold'n court in the streets. We be represent'n
in honor of all the casualties of Organic and
da man dat taught us to attack from the back...
Peace out, homeslice. ;0)

**From a C Student:** Just wanted to let you know that I loved your class, although it kicked my a**. But thanks for all the time you put in to the class. It's nice to see that professors care every once in a while. Good luck with everything!

From a C Student: This is _____. I really sorry that I was not able to communicate with you well when I was meeting with you. I have got very surprised when I check my grade. I have study three day straight plus half day including going to the study session. I was really confident about the exam. What I want to say was that Thank you so much for helping me and the class through the study session and the office hour. I truly appreciated your hard work and effort. I truly do appreciated that. Although I was really surprise on the grade. I

have no regret on what I got. I have put all my best effort in that exam through constant studying. However, without your effort and compassion to teach us (including me), the result might be different. I'm really glad to have you as my teacher, Dr. Novak. I will do my best in the future as well and not making the same mistake. Thank you Dr. Novak. Thank you!

# Bruce M. Novak

Published Papers

"Synthesis of a pyridine substituted polycarbodiimide and its use as a solid support for chemical reagents", Budhathoki-Uprety, Januka; Novak, Bruce M. *Polymer* **2010**, *51*, 2140-2146.

"A New, More Versatile, Optical Switching Helical Polycarbodiimide Capable of Thermally Tuning Polarizations ± 359°" Kennemur, J. G.; Clark, J. B.; Tian, G.; Novak, B. M. *Macromolecules* **2010**, *43*, 1867-1873

"Accelerated Suzuki Coupling via a Ligandless Palladium Catalyst: 4'-methoxy-2-methylbiphenyl", Goodson, F. G.; Wallow, T. I.; Novak, B. M. *Organic Synthesis* **2008**, 75.

"Helical Polyguanidines Prepared by Helix-Sense-Selective Polymerizations of Achiral Carbodiimides Using Enantiopure Binaphthol-Based Titanium Catalysts." Tang, Hong-Zhi; Garland, Eva R.; Novak, Bruce M.; He, Jiangtao; Polavarapu, Prasad L.; Sun, Frank Chen; Sheiko, Sergei, S. *Macromolecules* **2007**, *40*, 3575.

"Titanium complexes: a possible catalyst for controlled radical polymerization", Kwark, Young-Je; Kim, Jeonghan; Novak, Bruce M. *Macromol. Res.* **2007**, *15*, 31.

"Circumventing Pericyclic Reactions to Realize Insertion Polymerization of Cyclobutene Derivatives", Seto, K.; Novak, B. M. *Macromolecules* **2006**, *39*, 6785.

"A Thermal and Solvocontrollable Cylindrical Nanoshutter Based on a Single Screw Sense Helical Polyguanidine", Tang, H.-Z.; Novak, B. M.; He, J.; Polavarapu, P. L. *Angew. Chem. Int. Ed.* **2005**, *44*, 7298.

"Synthesis and characterization of random and block copolypeptides derived from γ-Methylglutamate and Leucine N-Carboxyanhydrides" Goury, V.; Jhurry, D.; Bhaw-Luximon, A.; Novak, B. M.; Belleney, J. *Biomacromolecules* **2005**, *6*, 1987-1991.

"Chiroptical Switching Polyguanidine Syntheized by Helix-Sense Selective Polymerization Using [(*R*)-3,3'-Dibromo-2,2'binaphthoxy](di-*t*-butoxy) Titanium(IV) Catalyst", Tang, H.-Z.; Boyle, P. D.; Novak, B. M. *J. Am. Chem. Soc.* **2005**, *127*, 2136-2142.

"Determination of the Kinetic Parameters of Atom Transfer Radical Polymerizations", Kwark, Y.-J.; Novak, B. M. *Macromolecules* **2004**, 37, 9395.

"One-pot, One-catalyst Synthesis of Graft Copolymers by Controlled ROMP and ATRP Polymerizations", Charvet, R; Novak, B. M. *Macromolecules* **2004**, *37*, 8808.

"Liquid Crystalline Properties of Polyguanidines", Kim, J.; Novak, B. M.; Wadden, A. J. *Macromolecules* **2004**, *37*, 8286.

"Helix-Sense-Selective Polymerization of Carbodiimides: Building Permanently Optically Active Polymers from Achiral Monomers" Tian, G.; Lu, Y.; Novak, B. M. *J. Am. Chem. Soc.* **2004**, *126*, 4082.

"Stable Helical Polyguanidines: Poly{*N*-(1-anthryl)-*N*'-[(*R*)- and/or (*S*)-3,7-dimethyloctyl]guanidines}, Tang, H.-Z.; Tian, G.; Capracotta, M. D.; Novak, B. M. *J. Am. Chem. Soc.* **2004**, *126*,3722.

"Lyotropic Liquid Crystalline Properties of Poly(N,N'-di-*n*-hexylguanidine)" Kim, J.; Novak, B. M.; Wadden, A. J. *Macromolecules* **2004**, *37*, 1660.

"Ethylene Polymerization Catalyzed by Neutral Nickel(II) Complex with O–N Chelating Ligand", Nodono, M.; Novak, B. M.; Boyle, P. T. *Polym. J.* **2004**, *36*, 140.

"The Synthesis and Crystal Structure of a Dinuclear Palladium Complex Containing C,O-Bridging Ester-Enolato Moieties", Gonglu Tian, Bruce M. Novak and Paul D. Boyle, *Organometallics* **2002**, *21*, 1462.

"Special Reactions in Homogeneous Aqueous Systems: Synthesis of Polymers", Novak, B, M. *Applied Homogeneous Catalysts with Organometallic Compounds,* 2d Ed., **2002**, *3*, 1274.

"Meta-Stable Enamines: Synthesis of Simple Enamines via Catalytic Isomerization of Allylic Amine Substrates and Their Polymerization Behavior" Novak, B. M.; Cafmeyer, J. T. *J. Am. Chem. Soc.* **2001**, *123*, 11,083.

"Helix Conformation in Helical Polycarbodiimides Studied by Solid State $^{13}C$ NMR", Lim, A.R., Novak, B. M. *Chem. Phys.* **2001**, *272*, 199.

"New Functional Monomers for Well-Controlled ROMP Polymerizations", Charvet, R.; Novak, B. M. *Macromolecules* **2001**, *34*, 7680.

"Neutral Palladium Complexes as Catalysts for Olefin-Methyl Acrylate Copolymerization: a Cautionary Tale", Tian, G.; Boone, H. W.; Novak, B. M. *Macromolecules* **2001**, *34*, 7656.

"Pyridine Rings as Protected 2° Amines: The Facile Hydrogenation of Heterocyclic Aromatic Polymers", Aoyama, Y.; Novak, B. M. *Macromolecules* **2001**, *34*, 6842.

"Synthesis and Characterization of Wormlike Three-Arm Poly (*n*-Hexyl Isocyanate) Star Polymers." Goodson-Hoff, S.; Novak, B. M. *Macromolecules* **2001**, *34*, 3849.

"Solid State $^{13}C$ Nuclear Magnetic Resonance for Polyguanidines", Lim, A. R.; Kim, J. H.; Novak, B. M. *Polymer* **2000**, *41*, 2431.

"Synthesis of β-Iminoaminate Zirconium Complexes and Their Application in Ethylene Polymerization", Jin, X.; Novak, B. M. *Macromolecules* **2000**, *33*, 6205.

"Carbon-13 T1ρ Investigation in Two Polycarbodiimides", Lim, A. R.; Chang, J. H., Kim, J. H., Novak, B. M. *Solid State Commun.* **2000**, *115*, 23.

"Copolymerization of Polar Monomers with Olefins Using Transition-Metal Complexes", Boffa, L. S.; Novak, B. M. *Chem. Rev.* **2000**, *4*, 1479.

"Evaluation of Short Term – High Intensity Thermal Degradation of Graphite Fiber Reinforced Laminates via Ultrasonic Spectroscopy", Schueneman, G. T.; Lesser, A. J.; Hobbs, T. R.; Novak, B. M. *J. Polym. Sci. Polym. Phys.***1999**, *37*, 2601.

"Rigidity of the Backbone for Poly(bis(4-butoxycarbonylphenyl))carbodiimide and Poly(bis(4-butylphenyl))carbodiimide Studied by Solid State $^{13}C$ T1ρ Measurements", Lim, A. R.; Kim, J. H.; Novak, B. M. *Chem. Phys.* **1999**, *246*, 373-380.

"Solid State NMR of $SiO_2$ Nanotube Coated Ammonium Tartrate Crystal" Lim, A. R.; Schueneman, G. T.; Novak, B. M. *Solid State Commun.* **1999**, *110*, 333-338.

"The *T*1ρ $^{13}C$ Spin-Lattice Relation Time of Helical Polyguanidines", Lim, A. R.; Stewart, J. R.; Novak, B. M. *Solid State Commun.* **1999**, *110*, 23.

"The 13C Spin-Lattice Relation Time of Interpenetrating Networks by Solid State NMR", Lim, A. R.; Schueneman, G. T.; Novak, B. M. *Solid State Commun.* **1999**, *109*, 465.

"The 13C Spin-Lattice Relation Time for Poly(di-N-hexylcarbodimide)" Lim, A. R.; Novak, B. M. *Solid State Commun.* **1999**, *109*, 29.

"'Link-Functionalized' and Triblock Polymer Architectures Through Bifunctional Organolanthanide Initiators: A Review", Boffa, L. S.; Novak, B. M. *J. Mol. Catal. A: Chem.* **1998**, *133*, 123-130.

"Trans Content In Atactic Polystyrene Estimated By Double-Quantum Solid-State NMR", Dunbar, M. G.; Novak, B. M.; Schmidt-Rohr, K. *Solid State Nucl. Magn. Reson.* **1998**, *12*, 119-137.

"Opalescent Cholesteric Networks from Chiral Polyisocyanates in Polystyrene", Maxein, G.; Keller, H.; Novak, B. M.; Zentel, R. *Adv. Mater.* **1998**, *3*, 341.

"Chain Stiffness of a High Molecular Weight Polyguanidine Prepared by Living Polymerization", Nieh, M.-P.; Goodwin, A. A.; Stewart, J. R.; Novak, B. M.; Hoagland, D. A. *Macromolecules*. **1998**, *31*, 3151.

"The Application of "Transfer-Free" Suzuki Coupling Protocols towards the Synthesis of "Unambiguously Linear" Poly(*p*-phenylenes)", Goodson, F. E.; Wallow, T. I.; Novak, B. M. *Macromolecules*. **1998**, *31*, 2047.

"Controlled Radical Polymerization of Bicyclic Olefins: A Simple Approach to Stabilizing Polystyrene Derived from ATRP Methodologies", Ellzey, K. A.; Novak, B. M. *Macromolecules*. **1998**, *31*, 2391.

"Trapped Kinetic States, Chiral Amplification and Molecular Chaperoning in Synthetic Polymers: Chiral Induction in Polyguanidines Through Ion Pair Interactions", Schlitzer, D. S.; Novak, B. M *J. Am. Chem. Soc.* **1998**, *120*, 2196.

"Living CO/Olefin Alternating Copolymerizations of Electron Poor Bicyclic Olefins Initiated by Neutral Palladium(II) Alkyl Complexes: A Route to the Perfectly Alternating Copolymer of CO and Acetylene", Safir, A. L.; Novak, B. M. *J. Am. Chem. Soc.* **1998**, *120*, 643.

"Accelerated Suzuki Couplings via a Ligandless Palladium Catalyst: 4-Methoxy-2'-methylbiphenyl", Goodson, F. E.; Wallow, T. I.; Novak, B. M. in Organic Synthesis, Smith, A. B., Ed., John Wiley & Sons: New York, vol 75, pg 61.

"Mechanistic Studies on the Aryl-Aryl Interchange Reaction of $ArPdL_2I$ (L = Triarylphosphine) Complexes", Goodson, F. E.; Wallow, T. I.; Novak, B. M. *J. Am. Chem. Soc.* **1997**, *119*, 12441.

"Bimetallic Samarium(III) Catalysts via Electron Transfer Initiation: The Facile Synthesis of Well-Defined (Meth)acrylate Triblock Copolymers", Boffa, L. S.; Novak, B. M. *Tetrahedron* **1997**, *53*, 15,367.

"A Palladium-Mediated Soluble Precursor Route into Poly(arylenes)", Goodson, F. E.; Novak, B. M. *Macromolecules* **1997**, *30*, 6047.

"The Polymerization of Free Enols with Electron-Deficient Comonomers", Novak, B. M.; Cederstav, A. K. *J. Macromol. Sci., Pure Appl. Chem.* **1997**, *A34*, 1815.

Novak, B. M.; Perrott, M. G. "Ring-Opening Metathesis Polymerization" in Catalysis in Precision Polymerization, Kobayashi, S., Ed., John Wiley & Sons: New York, 1997, pp. 100-112.

Novak, B. M. "Polymerization through Hetero-Functional Groups" in Catalysis in Precision Polymerization, Kobayashi, S., Ed., John Wiley & Sons: New York, 1997, pp. 113 - 133.

"'Link-Functionalized' Polymers: An Unusual Macromolecular Architecture Through Bifunctional Initiation", Boffa, L. S.; Novak, B. M. *Macromolecules* **1997**, *30*, 3494.

"Living Polymerization of Carbodiimides Initiated by Copper(I) and Copper(II) Amidinate Complexes", Shibayama, K.; Seidel, S. W.; Novak, B. M. *Macromolecules* **1997**, *30*, 3159.

"New Methods for the Synthesis of $ArPdL_2I$ (L = tertiary phosphine) Complexes," Wallow, T. I.; Goodson, F. E.; Novak, B. M. *Organometallics*, **1996**, 15, 3708.

"Organotitanium(IV)-Catalyzed Cyclopolymerizations of 1,2-Diisocyanates and Cyclocopolymerizations of Monoisocyanates with 1,2-Diisocyanates", Patten, T. E.; Novak, B. M., *Macromolecules* **1996**, *29*, 5882.

Novak, B. M. "Special Reactions in Homogeneous Aqueous Systems: Synthesis of Polymers" in Applied Homogeneous Catalysis with Organometallic Compounds, Cornils, B.; Herrmann, W. A., Eds., VCH: Weinheim, 1996, Vol. 2, pp 1132-1142.

"Living Organotitanium(IV)-Catalyzed Polymerizations of Isocyanates", Patten, T. E.; Novak, B. M. *J. Am. Chem. Soc.* **1996**, *118*, 1906.

"Living Ring Opening Metathesis Polymerizations of 3,4-Disubstituted Cyclobutenes and Synthesis of Polybutadienes with Protic Functionalities", Perrott, M. G.; Novak, B. M. *Macromolecules*, **1996**, *29*, 1817.

"Living 1,2-Vinyl-Insertion Polymerizations Initiated by Palladium(II) Alkyl Complexes: Block Copolymers and a Route to Polyacetylene-Hydrocarbon Diblocks," Safir, A. L.; Novak, B. M. *Macromolecules* **1995**, *28*, 5396.

"Organic Polymer Chemistry: A Primer," Bruce M. Novak, Saunders College Publishing, New York, 1995.

"Living Ring Opening Metathesis Polymerizations of 3,4-Difunctional Cyclobutenes," Perrott, M. G.; Novak, B. M. *Macromolecules* **1995**, *28*, 3492.

"Nanostructured Organic-Inorganic Hybrid Materials Synthesized Through Simultaneous Processes", Bruce M. Novak, Mark W. Ellsworth, and Celine Verrier, in Hybrid Organic-Inorganic Composites, Mark, J. E.; Lee, Y.-C.; Bianconi, P. A., Eds., ACS Symposium Series 585, American Chemical Society, Washington, DC, Chapter 8, 1995.

"Bimetallic Samarium(III) Initiators for the Living Polymerization of Methacrylates and Lactones. A New Route into Telechelic, Triblock, and 'Link-Functionalized' Polymers." Boffa, L. S.; Novak, B. M. *Macromolecules* **1994**, *27*, 6993.

"Silica as a Ligand: Reactivity of the Iridium-Oxygen bond of Cp*Ir[Silica](Ph)($PMe_3$)"; Meyer, T. Y.; Woerpel, K. A.; Novak, B. M.; Bergman, R. G. *J. Am. Chem. Soc.* **1994**, *116*, 10,290.

"The Synthesis of New Rigid Rod Helical Polymers through the Well-Controlled Polymerizations of Carbodiimides using Titanium(IV) Complexes", Goodwin, A.; Novak, B. M. *Macromolecules,* **1994**, *27*, 5520.

"Highly Efficient and Accelerated Suzuki Aryl Couplings Mediated by Phosphine-free Palladium Sources," Wallow, T. I.; Novak, B. M. *J. Org. Chem.* **1994**, *59*, 5034.

"Investigations into the Chemistry of Thermodynamically Unstable Species. The Direct Polymerization of Vinyl Alcohol, the Enolic Tautomer of Acetaldehyde", Cederstav, A. K.; Novak, B. M. *J. Am. Chem. Soc.* **1994**, 116, 4073.

"Living Polymerization of Butadiene at Both Chain Ends via a Bimetallic Nickel Catalyst. Preparation of Hydroxytelechelic Polybutadiene and Symmetric Poly(Isocyanide-*b*-Butadiene-*b*-Isocyanide) Elastomeric Triblock Copolymers," Deming, T. J.; Novak, B. M.; Ziller, J. W. *J. Am. Chem. Soc.* **1994**, *116*, 2366.

"The Synthesis and Photochemistry of Sulfonium Ion Polymers: Arylated and Alkylated Poly(*p*-Phenylene Sulfide) Derivatives," Novak, B. M.; Hagen, E.; Hoff, S.; Viswanathan, A. *Macromolecules* **1994**, *27*, 1985.

"Low Density, Mutually Interpenetrating Organic-Inorganic Composite Materials via Supercritical Drying Techniques," Novak, B. M.; Auerbach, D.; Verrier, C. *Chem. Mater.*, **1994**, *6*, 282.

"The Synthesis and Properties of Mutually Interpenetrating Organic-Inorganic Networks," Novak, B. M.; Ellsworth, M. W.; Verrier, C. in "Chemically Modified Surfaces", Pesek, J. J.; Leigh, I. E., Eds. Royal Society of Chemistry, Cambride, 1994, pg 41.

"Living Bimetallic Initiators for the Preparation of Triblock Copolymers," Novak, B. M.; Deming, T. J. *Makromol. Chem., Macromol. Symp.*, **1994**, *77*, 405.

"Versatile Organometallic Initiators for the Living Polymerization of Isocyanates," Novak, B. M.; Patten, T. E.; Hoff, S. M. J. *Makromol. Macromol. Symp., Pure Appl. Chem.,* **1994**, *A31*, 1619.

"Mechanistic Studies on the Nickel Catalyzed Polymerization of Isocyanides," Deming, T. J.; Novak, B. M. *J. Am. Chem. Soc.* **1993**, *115*, 9101.

"Use of Copolymerization Phenomena in Mechanistic Studies: Monomer Substituent Effects in Nickel Catalyzed Isocyanide Polymerizations," Deming, T. J.; Novak, B. M. *Macromolecules*, **1993**, *26*, 7092.

"Preparation and Reactivity Studies of Highly Versatile, Nickel Based Polymerization Catalyst Systems," Deming, T. J.; Novak, B. M. *Macromolecules*, **1993**, *26*, 7089.

"Complex Architectures Through Living Polymerizations. The Synthesis of "Once Broken Worms" and Triblock Copolymers Using Bimetallic Initiators," Hoff, S. M.; Novak, B. M. *Macromolecules*, **1993**, *26*, 4067.

"Air and Water Stable 1,2-Vinyl-Insertion Polymerizations of Bicyclic Olefins: A Simple Precursor Route to Polyacetylene," Safir, A. L.; Novak, B. M. *Macromolecules*, **1993**, *26*, 4072.

"Hybrid Nanocomposite Materials-Between Inorganic Glasses and Organic Polymers," Novak, B. M. *Adv. Mater.* **1993**, *5*, 422.

"'Inverse' Organic-Inorganic Composite Materials. 3. High Glass Content "Non-Shrinking" Sol-Gel Composites via Poly(Silicic Acid Esters)," Ellsworth, M. E.; Novak, B. M. *Chem. Mater.* **1993**, *5*, 839.

"Organotitanium(IV) Compounds as Catalysts for the Polymerization of Isocyanates: The Polymerization of Isocyanates with Functionalized Side Chains," Patten, T. E.; Novak, B. M. *Macromolecules,* **1993**, *26*, 436.

"Well-Defined Polyisocyanates Via Organotitanium(IV) Catalyzed Living Polymerizations of Isocyanates," Patten, T. E.; Novak, B. M. *Makromol. Chem., Macromol. Symp.*, **1993**, *67*, 203.

"High Glass Content Non-Shrinking Sol-Gel Composites Via Silicic Acid Esters," Ellsworth, M. W.; Novak, B. M. *Proc., Matl. Res. Soc.* **1993**, *274*, 67.

"Microstructural Studies of Poly(7-Oxabicyclo[2.2.1]hept-2-ene) Derivatives Prepared from Selected Ruthenium Catalysts," Benedicto, A. D.; Novak, B. M.; Grubbs, R. H.; *Macromolecules*, **1992**, *25*, 5893.

"Enantioselective Polymerizations of Achiral Isocyanides. Preparation of Optically Active Helical Polymers Using Chiral Nickel Catalysts," Deming, T. J.; Novak, B. M. *J. Am. Chem. Soc.,* **1992**, *114*, 7926.

"'Living' Polymerizations as Mechanistic Probes. Stereoselection in the Nickel Catalyzed Polymerization of Chiral Isocyanides," Deming, T. J.; Novak, B. M. *J. Am. Chem. Soc.* **1992**, *114*, 4400.

"Aqueous Ring-Opening Metathesis Polymerization of Carboximide-Functionalized 7-oxanorbornenes," Hillmyer, M. A.; Lepetit, C.; McGrath, D. V.; Novak, B. M.; Grubbs, R. H. *Macromolecules* **1992**, *25*, 3345.

"The Development of Well-Defined Catalysts for Ring Opening Metathesis Polymerizations (ROMP)," Novak, B. M.; Risse, W.; Grubbs, R. H. *Advances in Polymer Synthesis* **1992**, *102*, 47.

"Mutually Interpenetrating Inorganic-Organic Networks. New Routes into Non-Shrinking Sol-Gel Composite Materials," Ellsworth, M. W.; Novak, B. M. *J. Am. Chem. Soc.* **1991**, *113*, 2756.

"'Living' Titanium(IV) Coordination Polymerizations of Isocyanates," Patten, T. E.; Novak, B. M. *J. Am. Chem. Soc.* **1991**, *113*, 5065.

"*In Aqua* Synthesis of Water-Soluble Poly(p-Phenylene) Derivatives," Wallow, T. I.; Novak, B. M. *J. Am. Chem. Soc.* **1991**, *113*, 7411.

"'Inverse' Organic-Inorganic Composite Materials 2. Free Radical Routes into Nonshrinking Sol-Gel Composites," Novak, B. M.; Davies, C. *Macromolecules* **1991**, *24*, 5481.

"'Change of Mechanism' Block Copolymerizations. The Formation of Block Copolymers Containing Helical Polyisocyanide and Elastomeric Polybutadiene Segments," Deming, T. J.; Novak, B. M. *Macromolecules* **1991**, *24*, 5478.

"Organometallic Chemistry in Air and Water: The Oxygen Enhanced, Nickel Catalyzed Polymerization of Isonitriles," Deming, T. J.; Novak, B. M. *Macromolecules* **1991**, *24*, 326.

"Polyisocyanides Using $[(\eta^3\text{-}C_3H_5)Ni(OC(O)CF_3)]_2$: Rational Design and Implementation of a Living Polymerization Catalyst," Deming, T. J.; Novak, B. M. *Macromolecules* **1991**, *24*, 6043.

"Aqueous Ring-Opening Metathesis Polymerizations of 7-Oxanorbornene Derivatives Using Ruthenium Catalysts," McGrath, D. V.; Novak, B. M.; Grubbs, R. H. in Olefin Metathesis and Polymerization Catalysts, Imamoglu, Y., Ed., Kluwer Academic Publishers, The Netherlands, **1990**, pp. 525-536.

"Living Ring Opening Metathesis Polymerizations of Cyclic Olefins," Novak, B. M., Grubbs, R. H. in Encyclopedia of Polymer Science and Engineering, 2nd

Edition, Mark, H. F.; Bikales, N. M.; Overberger, C. G.; Menges, G.; Kroschwitz, J. I., Eds., John Wiley and Sons, Inc., New York, **1990**, p. 420.

"Polymer Synthesis Using Stable Organometallic Intermediates," Novak, B. M., Grubbs, R.H. 1990 Yearbook of Science and Technology, McGraw-Hill, New York, **1990**.

"The Reactivity and Ligand Dynamics of a Skeletally Chiral Metal Cluster," Hajela, S.; Novak, B. M.; Rosenberg, E. *Organometallics* **1989**, *8*, 468.

"Synthesis of Mercury-Bridged Transition Metal Clusters," Novak, B. M.; Rosenberg, E. in *Inorganic Synthesis* **1989**, 26, 328.

"Catalytic Organometallic Chemistry in Water: The Aqueous Ring Opening Metathesis Polymerization of 7-Oxanorbornene Derivatives," Novak, B. M.; Grubbs, R. H. *J. Am. Chem. Soc.* **1988**, *110,* 7542.

"The Ring Opening Metathesis Polymerization of 7-Oxabicyclo[2.2.1]hept-5-ene Derivatives: A New Acyclic Polymeric Ionosphere," Novak, B. M.; Grubbs, R. H. *J. Am. Chem. Soc.* **1988**, *110*, 960.

## Patents Granted

"Devices Containing Chiroptical Switching Materials and Methods of Making and Using the Same", Novak, B. M.; Tang, H.-Z. US Patent 7,790,912, September 7, **2010**

"Cyclobutene polymers and methods of making the same." PCT Int. Appl. (**2008**), WO 2008024241 (Granted **2010**)

"Stereoregular Polar Vinyl Polymers and Methods of Making the Same", Kuwahara, H; Novak, B. M., US Patent 7,091,293, August 15, **2006**.

"Method for producing a Polymer by Coordination Polymerization", Kuwahara, H; Novak, B. M. U.S. Patent 6,579,956, June 17, **2003**.

"Organometallic compound-masked monomers for use in the coordination polymerization." Tanaka, Hiromitsu; Novak, Bruce M. Jpn. *Kokai Tokkyo Koho* **2001**, 15 pp.

"Isomerization of allenes into alkynes for polymerization." Nakano, Mitsuru; Novak, Bruce Michael, *Jpn. Kokai Tokkyo Koho* **2000**, 4 pp.