



# THE MACROCENTER

The Center for Macromolecular Science & Engineering  
at The University of Florida



# THE MACROCENTER welcomes new

**Henry Hess**, hhess@mse.ufl.edu, is currently an assistant professor at the Department of Materials Science and Engineering of the University of Florida. He received a diploma in physics from the Technical University Berlin in 1996, and obtained his Dr rer. nat. (summa cum laude) in experimental physics from the Free University of Berlin in 1999 under the guidance of Ludger Woeste. His postdoctoral studies were conducted from 2000 to 2002 at the Department of Bioengineering, University of Washington, where he also served as a research assistant professor (2002-2005). He received the Wolfgang Paul Award of the German Society for Mass Spectrometry (2000), the Feodor Lynen postdoctoral fellowship of the Alexander-von-Humboldt foundation (2000), the Distinguished Mentor Award of the UF/HHMI "Science for Life" program (2007), and, together with his postdoctoral mentor Viola Vogel, the Philip Morris Forschungspreis (2005).

## Research Interests

Biomolecular motors, such as the motor protein kinesin, convert the chemical energy stored in adenosine triphosphate with high efficiency into mechanical work. Their nanoscale dimensions and independence from external connec-

tions enables them to act as independent agents in a liquid environment, capable of performing a variety of tasks in nanotechnology, such as directed transport or

active assembly and disassembly. The integration of such nanoengines into nanodevices and multifunctional materials raises a host of intriguing engineering questions, some related to the biological origin of the motors and others of general relevance to the field of molecular motors. Our increasing experience with the integration of biomolecular motors into synthetic devices and the expanding knowledge about the biological functions of motor proteins sharpen the focus on the uniqueness and feasibility of application ideas related to, for example, biosensors and advanced materials.



**So Hirata**, hirata@qtp.ufl.edu, received his B.Sc. (1994) and M.Sc. (1996) from the University of Tokyo and his Ph.D. (1998) from the Institute for Molecular Science, where he was also a Young Fellow of Japan Society for Promotion of Science (1996-1999). He spent the subsequent three years at the University of California, Berkeley, as a Visiting Scholar and then at the University of Florida as a postdoctoral research associate. He also worked as a senior research scientist in Pacific Northwest National Laboratory from 2001 to 2004 and was appointed as an assistant professor at the University of Florida in 2004. He received the Hewlett-Packard Outstanding Junior Faculty Award in 2008.

## Research Interests

Dr. Hirata has led a wide array of methodological development efforts in theoretical chemistry ranging from the first-principles electronic structure methods of infinitely extended systems (polymers), time-dependent density functional theory (TDDFT), "ab initio" density functional theory (DFT) based on optimized effective potentials, automatic implementations of many-electron theories such as high-order



# w faculty

coupled-cluster (CC) theory, to vibrational many-body theories. He is also a primary author of quantum chemistry software POLYMER and TCE and a co-author of Q-CHEM, NWCHEM, and UTCHEM. He has written over 70 published articles in peer-reviewed journals or proceedings and two book chapters. His papers have been cited over 2000 times. He has been an invited plenary speaker of numerous conferences and a lecturer at many universities worldwide.



**Stephen A. Miller**, miller@chem.ufl.edu, received B.S. and M.S. degrees in Chemistry from Stanford University in 1994. In 1999, he earned his Ph.D. in Chemistry from the California Institute of Technology. Thereafter, Dr. Miller was a Postdoctoral Associate at the Massachusetts Institute of Technology for 18 months and began his Assistant Professorship at Texas A&M University in 2001. In 2007, Dr. Miller joined the Chemistry Department at the University of Florida as an Associate Professor.

## Research Interests

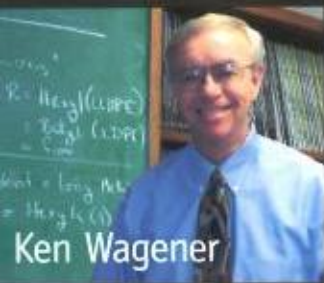
Approximately 90% of all manufactured chemical products rely on catalysis sometime during their production cycle. We seek to develop innovative catalysts, especially those directed toward polymerization chemistry. Our targeted catalysts are often relevant to industrial applications, offering mechanistic insight, improved catalytic behavior, or altogether new pathways for catalytic bond formation. Similarly, our targeted polymers are often relevant to commercial materials, offering novel or enhanced polymeric properties and insight into structure/property relationships. Not only do we employ traditional petroleum-based mono-

mers such as ethylene and propylene, we also create new chemistry in order to exploit the array of biorenewable feedstocks readily available from biomass. Several ongoing projects

include: catalyst design for the preparation of syndiotactic polypropylene and related copolymers; elastomeric polypropylene based on the isotactic-heterotactic or syndiotactic-heterotactic microstructures; oxygen rich polymers from biorenewable feedstocks such as polylactic acid and polyoxymethylene; the use of cyanide as a versatile catalyst for oligomerization and polymerization via aldimine coupling; theoretical models of polymer tacticity; and the application of DFT calculations to polymerization chemistry.



**The Center is comprised of 19 faculty along with over 120 students and staff operating in four departments on campus.**



Ken Wagener

**Most people in the polymer world know that teaching and research have been active at Florida for a long time - more than 60 years, in fact.** What

people don't seem to realize is that growth in our field has accelerated in just the past 5 years. This growth on campus reflects the growth within the macromolecular industry worldwide, a natural extension of the field.

And so with this brochure we introduce you to three new faculty members who have joined the MacroCenter, each with a different perspective, each being educated in a different country, each with a different form of training. Henry Hess received his first university degree as a physicist in Berlin, So Hirata in molecular science in Tokyo, and Steve Miller as an organometallic chemist in California. The fact that all three have joined the MacroCenter speaks for the diversity of the type of science that makes up what macromolecular science is today.

Take a moment to read their descriptions on the inside of this brochure. Contact them directly if you need more information - their email addresses appear right after their names. Henry, So, and Steve are helping to define the future of macromolecular science at the University of Florida, and we are most pleased to have them with us.

We look forward to hearing from you.

—Ken Wagener

## KEEP IN TOUCH

We want to hear from you! Send your comments to our MacroCenter Office Administrator, Ms. Sara Klossner, email [Klossner@chem.ufl.edu](mailto:Klossner@chem.ufl.edu), or write her at Department of Chemistry, P.O. Box 117200, Gainesville, FL 32611-7200. Please include your email address if you have one, photos are welcome, too.

### UF UNIVERSITY of FLORIDA Center for Macromolecular Science & Engineering

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