

Songsu Kang

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Highlights

- Skilled in a broad range of **organic synthetic procedure applied both to polymers and to monomers, purification techniques, and analysis**
- **Expertise in synthesis** of conjugated polymers, supramolecular polymers and block copolymers
- Solid skills in **characterization of polymer materials with various methods**, such as **GPC, TGA, DSC, AFM, powder x-ray diffraction, and SAXS**
- Expertise in **synthesis and development of organometallic catalysts** including Ru and Pd based metal complexes
- **Permanent Resident Alien**

Professional Experience

Post-doctoral Research Fellow; The University of Texas at Austin Nov 2010 - Oct 2015

Synthesis of well-defined conjugated **polymers and block copolymers** via chain-growth polymerization for **electric device and solar cell applications**

- Involved in highly interdisciplinary projects of the Center for Nano- and Molecular Science and Technology (CNM), the site of an Energy Frontier Research Center (EFRC) funded by U.S. Department of Energy (DOE) Office of Basic Energy Sciences.
- Synthesized new monomers, palladium catalysts for chain-growth polycondensation, telechelic polymers and end group-functionalized polymers, random copolymers.
- Developed new synthetic methods to synthesize well defined π -conjugated polymers and block copolymers via Chain-Growth Kumada Catalyst Transfer Polycondensation with Ni catalyst, via Still-Type Chain-Growth Catalyst Transfer Polycondensation with Pd catalyst, via a combination of Ring-Opening Olefin Metathesis Polymerization and Grignard Metathesis Polymerization and via Mechanistically-Distinct Polymerization using a Palladium Catalyst.
- Prepared PPE brushes from silica nanoparticles via surface-initiated polymerization. Conducted research in main chain functionalization of polymer backbone.
- **Characterized polymerization** product with **TEM, TGA, AFM, powder X-ray, U.V.-vis, DSC, MALDI-TOF, SAXS**, and absorption and fluorescence spectroscopy.
- Supervised undergraduate research projects.

Graduate Research Assistant; Texas Tech University

Jun 2006 - Oct 2010

Synthesis of **supramolecules and supramolecular polymers**

- Synthesized olefinic Sauvage-type [2]catenane as a monomer, modified ruthenium initiators for polyrotaxanes and molecular necklace, and [3]catenanes with a double ring-closing olefin metathesis reactions.

- Developed new methods to synthesize polypseudorotaxanes via entropy-driven ring-opening olefin metathesis polymerization of [2]catenanes, and to show precise synthetic control over linear number of density of threaded macrocycles within polypseudorotaxanes via random ring-opening olefin metathesis polymerization.

Graduate Teaching Assistant; Texas Tech University Sep 2004 – May 2006

- Instructed multiple laboratory sections in general and organic chemistry.
- Supervised undergraduates in general and organic chemistry labs including Dr. Mayer's.

Research Assistant Intern; Korean institute chemical technology Jan 2004 – Jul 2004

Synthesis of herbicides, flucetosulfuron derivatives and intermediates

- Prepared various key intermediates for final product with organic reactions.
- Experienced microwave promoted reactions.

Graduate Research Assistant; Chungnam National University Mar 2002 – Feb 2003

Synthesis of tetracyclic azaindole derivatives by palladium-catalyzed annulations of internal alkynes

- Prepared new starting materials and multiple internal alkynes
- Synthesized tetracyclic azaindole derivatives by palladium-catalyzed annulations of *o*-iodoimine and internal alkynes

Graduate Teaching Assistant; Chungnam National University Mar 2001 – Dec 2001

- Tutored undergraduate students in general and organic chemistry.

Graduate Teaching Assistant; Chemistry Olympiad for Korean Chemical Society Jun 2001

- Instructed high school students in general chemistry.

Undergraduate Research Assistant Intern; Korean Institute Chemical Technology Mar 2001 – Feb 2002

- Synthesized 5-[[4-[2-(2-pyridinylamino)ethoxy]phenyl]methyl]-2,4-thiazolidinedione

Education

The University of Texas at Austin, Austin, TX Nov 2010 – present

Postdoctoral Fellow, Department of Chemistry and Biochemistry

Advisor: C. Grant Willson

Texas Tech University, Lubbock, TX Dec 2010

Ph.D. in Organic Chemistry

Research advisor: Prof. Mayer, Michael F.

Dissertation Topic: Synthesis of polypseudorotaxanes and polyrotaxanes via ring-opening olefin metathesis polymerization of [2]catenanes

Chungnam National University, Daejeon, South Korea Feb 2003

M.S. in Chemistry

Research advisor: Prof. Yum, Eul Kgun

Thesis topic: "Synthesis of tetracyclic azaindole derivatives by palladium-catalyzed annulations of internal alkynes"

Other Activity/ Affiliation

Founding president of student affiliate; Chungnam National University Mar 1998 – Feb 2001

- Chemtopia, delved into theoretical and experimental concepts of chemistry for undergraduate students.

American Chemical Society, Member (2008-2009, 2014-present)

Skills

- Design and efficient synthesis of novel monomers for polymerizations
- Polymer characterizations including GPC, DSC, AFM, TGA, TEM, powder X-ray diffraction, SAXS, U.V.-Vis spectroscopy
- Expertise in synthesis of conjugated polymers and block copolymers, surface-initiated polymerization and characterizations, olefin metathesis chemistry, palladium catalyst, ruthenium carbene complex (Grubbs' first, second and third generation catalyst, Grubbs-Hoveyda catalyst, bulky ruthenium-based olefin metathesis initiators), interlocked molecules and supramolecular polymers, organometallic reactions (Palladium-catalyzed annulations, Heck reaction, Suzuki reaction, Sonogashira coupling reaction, etc.)

Publications

1. "Synthesis of metallated pseudorotaxane polymers with full control over the average linear density of threaded macrocycles", **Kang, Songsu**; Mustafa Cetin, M.; Jiang, Ruijiang; Clevenger, Eric S.; Mayer, M. F. *J. Am. Chem. Soc.* **2014**, *136*, 12588.
2. "Synthesis of poly(3-hexylthiophene)-*block*-poly(ethylene)-*block*-poly(3-hexylthiophene) via a combination of ring-opening olefin metathesis polymerization and Grignard metathesis polymerization", **Kang, Songsu**; Ono, Robert J.; Bielawski, C. W. *J. Polym. Sci. A: Polym. Chem.* **2013**, *51*, 3810.
3. "Controlled Catalyst Transfer Polycondensation and Surface-Initiated Polymerization of a *p*-Phenyleneethynylene-Based Monomer" **Kang, S.**; Ono, R. J.; Bielawski, C. W. *J. Am. Chem. Soc.* **2013**, *135*, 4984.
4. "Controlled Chain-Growth Kumada Catalyst Transfer Polycondensation of a Conjugated Alternating Copolymer", Ono, Robert J.; **Kang, Songsu**; Bielawski, S. W. *Macromolecules* **2012**, *45*, 2321
5. "Polypseudorotaxanes via ring-opening metathesis polymerizations of [2]catenanes", **Kang, Songsu**; Berkshire, Brandon M.; Xue, Zheng; Gupta, Manav; Layode, Christianah; May, Preston A.; Mayer, Michael F. *J. Am. Chem. Soc.* **2008**, *130*, 15246.
6. "A double ring-closing olefin metathesis approach to [3]catenanes", Gupta, Manav; **Kang, Songsu**; Mayer, Michael F. *Tetrahedron Lett.* **2008**, *49*, 2946.

7. "Synthesis of tetracyclic 5-azaindole analogues by palladium-catalyzed sequential annulations", Sung, Nack-Do; Yang, Ok-Kyung; **Kang, Song Su**; Yum, Eul Kgun., *Bull. Korean Chem. Soc.* **2004**, *25*, 1351.
8. "Synthesis of pyridopyrrolo[2,1-a]isoindoles by palladium-catalyzed annulations", **Kang, Song Su**; Yum, Eul Kgun; Sung, Nack-do *Heterocycles* **2003**, *60*, 2727

Selected presentations

1. "Controlled catalyst transfer polycondensation of a p-phenyleneethynylene-based monomer: Surface-initiated polymerizations and other applications", **Kang, Songsu**; Ono, Robert J.; Bielawski, C. W. 246th ACS National Meeting & Exposition, Indianapolis, IN, United States, September 8-12, 2013
2. "Precise synthetic control over the average density of threaded macrocycles within polypseudorotaxanes", Mayer, Michael F.; **Kang, Songsu**; Jiang, Ruiyang. 65th Southwest Regional Meeting of American Chemical Society, El Paso, TX, United States, November, 4-7, 2009.
3. "The synthesis of polyrotaxanes with internal stoppers", Jiang, Ruiyang; **Kang, Songsu**; Mayer, Michael F. SACNAS National conference, Dallas, TX, United States, October, 15-18, 2009.
4. "Efforts toward the preparation of mobile (slip-link) cross-linked polymeric material", Mayer, Michael F; **Kang, Songsu**; Xue, Zheng; Gupta, Manav. North American Thermal Analysis Society 37th Annual Conference, Lubbock, TX, United States, September, 20-23, 2009.
5. "Toward the synthesis of interlocked polymeric compounds", Gupta, Manav; **Kang, Songsu**; Berkshire, Brandon M.; Mayer, Michael F. 236th ACS National Meeting, Philadelphia, PA, United States, August 17-21, 2008.
6. "Synthesis of polyrotaxanes via ring-opening metathesis polymerization", **Kang, Songsu**; Gupta, Manav; Berkshire, Brandon M.; Mayer, Michael F. 236th ACS National Meeting, Philadelphia, PA, United States, August 17-21, 2008.
7. "Interlocked polymers via ring-opening olefin metathesis polymerization of catenanes", Mayer, Michael F.; **Kang, Songsu**; Gupta, Manav. 236th ACS National Meeting, Philadelphia, PA, United States, August 17-21, 2008.
8. "Interlocked polymer via ring-opening-metathesis polymerizations of catenanes", Mayer, Michael F.; **Kang, Songsu**; Gupta, Manav; Berkshire, Brandon M. 3rd joint international symposium on macrocyclic and supramolecular chemistry, Las Vegas, Nevada, July 13-18, 2008.
9. "Synthesis of polypseudorotaxanes and polyrotaxanes", May, Preston A.; **Kang, Songsu**; Layode, Christianah; Mayer, Michael F. 63rd Southwest Regional Meeting of the American Chemical Society, Lubbock, TX, United States, November, 4-7, 2007.
10. "Polyrotaxanes from olefinic [2]catenanes", **Kang, Songsu**; May, Preston A.; Layode, Christianah; Mayer, Michael F. 63rd Southwest Regional Meeting of the American Chemical Society, Lubbock, TX, United States, November 4-7, 2007.
11. Polyrotaxanes via ring-opening metathesis polymerizations of [2]catenanes", Mayer, Michael F.; **Kang, Songsu**. 63rd Southwest Regional Meeting of the American Chemical Society, Lubbock, TX, United States, November, 4-7.