# Weck (GA Tech) Contributions to Caltech MURI

## Technical Section

See attached

## Progress Statement

Over the past 5 years, the Weck group has made significant progress on the investigations towards a) noncovalent functionalization strategies in synthetic polymers in particular sequence controlled block copolymers, b) novel concepts in template polymerizations, c) surface functionalization strategies using noncovalent interactions, d) functionalization and crosslinking of sequence controlled copolymers, and finally e) synthesis of sequence controlled copolymers for organic light-emitting diode applications.

## Technology Transfer

none

## Refereed Journal Articles

"Bridged Coordination Polymer Multilayers with Tunable Properties" Clint R. South and Marcus Weck* *Langmuir* **2008**, *24*, 7506-7511.

"Erasable Supramolecular Polymer Multilayers on Gold" Clinton R. South, Victor Piñon III, and Marcus Weck* *Angew. Chem., Int. Ed.* **2008**, *47*, 1425-1428.

"Norbornene-Based Copolymers with Iridium Complexes and Bis(Carbazolyl)fluorene Groups in Their Side-Chains and Their Use in Light-Emitting Diodes" Alpay Kimyonok, Benoit Domercq, Andreas Haldi, Jian-Yang Cho, Joseph R. Carlise, Xian-Yong Wang, Lauren E. Hayden, Simon C. Jones, Stephen Barlow, Seth R. Marder, Bernard Kippelen*, and Marcus Weck* *Chem. Mater.* **2007**, *19*, 5602-5608.

"Template Enhanced Ring-Opening Metathesis Polymerization" Clinton R. South and Marcus Weck* *Macromolecules* **2007**, *40*, 1386-1394.

"Modular and Dynamic Functionalization of Polymeric Scaffolds" Clinton R. South, Caroline Burd, and Marcus Weck* *Acc. Chem. Res.* **2007**, *40*, 63-74.

"Noncovalent Side-Chain Functionalization of Terpolymers" Clinton R. South, Ken C.-F. Leung, Daniela Lanari, J. Fraser Stoddart,* and Marcus Weck* *Macromolecules* **2006**, *39*, 3738-3744.

"Self-Assembly With Block Copolymers Using SCS Pd(II) Pincer Metal Coordination and Pseudorotaxane Formation" Clinton R. South, Mary Nell Higley, Ken C.-F. Leung, Daniela Lanari, Alshakim Nelson, Robert H. Grubbs*, J. Fraser Stoddart*, and Marcus Weck* *Chem. Eur. J.* **2006**, *12*, 3789-3797.

"Self-Sorting in Polymers" Caroline Burd and Marcus Weck* *Macromolecules* **2005**, *38*, 7225-7230.

"A Modular Approach toward Block Copolymers" Mary Nell Higley, Joel M. Pollino, Eric Hollembeak, and Marcus Weck* *Chem. Eur. J.* **2005**, *11*, 2946-2953.

"Multifunctionalization of Synthetic Polymer Systems *via* Self-Assembly" Warren Gerhardt, Matija Crne, and Marcus Weck* *Chem. Eur. J.* **2004**, *10*, 6212-6221.

"Non-Covalent Side-Chain Polymers: Design Principles, Functionalization Strategies, and Perspectives" Joel M. Pollino and Marcus Weck* *Chem. Soc. Rev.* **2005**, *34*, 193-207.

"Cross-linked and Functionalized 'Universal Polymer Backbones' *via* Simple, Rapid, and Orthogonal Multi-Site Self-Assembly" Joel M. Pollino, Kamlesh P. Nair, Ludger P. Stubbs, Jacob Adams, and Marcus Weck* *Tetrahedron* **2004**, *60*, 7205-7215 (special issue in honor of Professor Robert H. Grubbs' Tetrahedron Price).

## Books and Chapters

"Noncovalent Side-Chain Modification" Kamlesh P. Nair[#] and Marcus Weck, Wiley VCH in press

## Technical Reports

none

## Presentations

| | |
|---|---|
| (1) May 21, 2008 | *Side-Chain Functionalized Supramolecular Polymers*, Middle Atlantic Regional Meeting of the ACS, Queens, NY |
| (2) November 8, 2007 | *Functional Polymers via Self-Assembly*; Brooklyn Polytechnic University, Brooklyn, NY |
| (3) November 1, 2007 | *Multifunctional Materials via Self-Assembly*; Russell Marker Symposium, University of Maryland, College Park, MD |
| (4) September 21, 2007 | *Functional Polymers via Self-Assembly*; University of Connecticut, Storrs, CT |
| (5) August 19, 2007 | *Multifunctional Materials via Self-Assembly*; Symposium in Honor of Sir Fraser Stoddart, National ACS meeting, Boston, MA |
| (6) August 19, 2007 | *Metal Complexes as Synthons for the Synthesis of Polymeric Materials*; Symposium on: Metal Complexes in Polymer Science; National ACS meeting, Boston, MA |
| (7) July 30, 2007 | *Supramolecular Polymers Based on ROMP*; International Symposium on Olefin Metathesis, Pasadena, CA |
| (8) June 21, 2007 | *Functional Polymeric Architectures via Self-Assembly;* Gordon Research Conference, Polymer East, Mount Holyoke, South Hadley, MA |
| (9) May 2, 2007 | *Functional Polymers via Multi-Site Self-Assembly*; Virginia Tech, Blacksburg, VA |
| (10) March 29, 2007 | *Functional Polymeric Architectures via Self-Assembly;* Purdue University, West Lafayette, IN |
| (11) March 26, 2007 | *Functional Polymeric Architectures via Self-Assembly*; Symposium on: Exploring and Exploiting Nature with Biomimetics; National ACS meeting, Chicago, IL |

(12) March 5, 2007 — *Functional Polymers via Multi-Site Self-Assembly*; Georgia Institute of Technology, School of Polymer and Textiles Engineering, Atlanta, GA

(13) February 23, 2007 — *Functional Polymers via Multi-Site Self-Assembly*; Rutgers University, Newark, NJ

(14) January 20, 2007 — *Functional Polymers via Multi-Site Self-Assembly*; Tulane University, New Orleans, LA

(15) October 24, 2006 — *Functional Polymers via Multi-Site Self-Assembly;* UCLA NanoSystems Seminar Series; University of California Los Angeles, Los Angeles, CA

(16) July 22, 2006 — *Functional Polymers via Multi-Site Self-Assembly*; Nobel Celebration Symposium for Robert H. Grubbs, Pasadena, CA

(17) June 9, 2006 — *Self-Assembly Strategies Towards Functional Polymers*; University of Eindhoven, The Netherlands

(18) June 1, 2006 — *Self-Assembly Strategies Towards Functional Polymers*; New York University, New York, NY

(19) April 26, 2006 — *Functional Polymers via Multi-Site Self-Assembly*; Solvay/Cope Symposium on Organic Electronics, Atlanta, GA

(20) February 7, 2006 — *Materials Design via Self-Assembly*; University of Wisconsin, Madison, WI

(21) November 11, 2005 — *Functional Polymers via Multi-Recognition Site Self-Assembly*; University of Chicago, Chicago, IL

(22) November 8, 2005 — *Functional Polymers via Multi-Recognition Site Self-Assembly*; University of Michigan, Ann Arbor, MI

(23) October 14, 2005 — *Functional Polymers via Multi-Recognition Site Self-Assembly*; DuPont Corporation, Wilmington, DE

(24) September 9, 2005 — *Functional Polymers via Multi-Recognition Site Self-Assembly*; University of Texas at Austin, Austin, TX

(25) August 28, 2005 — *Non-Covalently Functionalized Copolymers*; National ACS Meeting, Washington DC

(26) June 16, 2005 — *Functional Polymeric Architectures via Multi-Step Self-Assembly*; Gordon Research Conference on Supramolecules and Assemblies

(27) February 18, 2005 — *Functional Polymers via Multi-Recognition Site Self-Assembly*; University of Massachusetts, Amherst, MA

(28) February 5, 2005 — *Functional Polymeric Architectures via Multi-Recognition Site Self-Assembly*; University of New Orleans, New Orleans, LA

(29) January 28, 2005 — *Functional Polymeric Architectures via Multi-Recognition Site Self-Assembly*; University of North Carolina, Chapel Hill, NC

(30) October 25, 2004 — *Functional Polymeric Architectures via Multi-Recognition Site Self-Assembly*; University of Illinois at Urbana-Champaign, Urbana-Champaign, IL

| | |
|---|---|
| (31) September 10, 2004 | *Functional Polymeric Architectures via Multi-Recognition Site Self-Assembly*; New York University, New York, NY |
| (32) May 7, 2004 | *Materials Design via Multi Recognition Site Self-Assembly*; FAME Meeting, Orlando, FL |
| (33) April 28, 2004 | *Functional Polymeric Architectures via Multi-Recognition Site Self-Assembly*; University of North Carolina, Charlotte, NC |

## Patents

"*Norbornene-Bases Copolymers With Iridium Complexes and Bis(Carbazole) Flurone Groups in Their Side-Chains and Use Thereof*." A. Kimyonok, B. Domercq, A. Haldi, J.Y. Cho, J.R. Carlisle, X.Y. Wang, L.E. Hayden, S.C. Jones, S. Barlow, S.R. Marder, B. Kippelen, M. Weck, Provisional Patent Application #60/956,492, filed August 17, 2007.

"*Carbazole-Based Hole-Transport and/or Electron Blocking Materials and/or Host Polymer Materials*." Y. Zhang, S.R. Marder, C. Zuniga, S. Barlow, B. Kippelen, A. Haldi, B. Domercq, M. Weck, A. Kimyonok, Provisional Patent Application #61015641, filed December 20, 2007.

"*ROMP-Polymerizable Electron Transport Materials Based on a Bis-Oxadiazole Moiety*." S. R. Marder, S. Barlow, Y. Zhang, S. Pal, B. Kippelen, B. Domercq, A. Haldi, M. Weck, A. Kimyonok, U.S. Provisional Patent Application #61/015,777, filed December 21, 2007.

## Honors

| | |
|---|---|
| 2007 | Tetrahedron Most Cited Paper 2004-2007Award |
| 2006 | Sigma Xi Young Faculty Award |
| 2006 | CETL/BP Junior Faculty Teaching Excellence Award |
| 2005 | Camille Dreyfus Teacher-Scholar Award |
| 2005 | Alfred P. Sloan Research Fellow |

## Related Sponsored Work

Solvay, SA - Polymeric Materials for New Generations of Displays and Solid-State Light Sources, Marcus Weck (co-PI), April 1, 2006 - December 31, 2008, $1,920,000

## ONR Statistics

| | |
|---|---|
| Papers Published: | 11 |
| Papers in Press: | 0 |
| Books/Chapters: | 0 |
| Books/Chapters in Press: | 1 |
| Technical Reports: | 0 |
| Invention Disclosures: | 0 |
| Patents Awarded: | 0 |
| Patents Pending: | 3 |
| Presentations: | 33 |
| Degrees Granted: | 7 |
| Honors: | 5 |
| Graduate Students (Total): | 8 |

| | |
|---|---|
| Women Graduate Students: | 3 |
| Minority Graduate Students: | 0 |
| Undergraduate Students (Total): | 0 |
| Women Undergraduate Students (Total): | 0 |
| Minority Undergraduate Students (Total): | 0 |
| Post Doctoral Students (Total): | 0 |
| Women Post Doctoral Students (Total): | 0 |
| Minority Post Doctoral Students (Total): | 0 |