

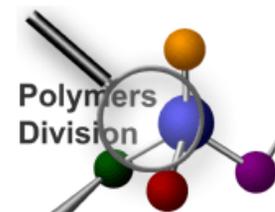
Welcome to NCMC-9
Combinatorial Methods for
Nanostructured Materials



NIST Combinatorial Methods Center
NIST Gaithersburg, MD
April 24-25, 2006

NIST

National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce



Welcome to NCMC-9



- NIST Combinatorial Methods Center Member and Team Update
- NCMC-9 Workshop Goals
- NCMC-9 Agenda Overview

NCMC Member Partners



Currently 18 institutions



NCMC Research Team



Nanometrology / Nanomaterials



Mike
Fasolka



Kirt Page



Alamgir
Karim



Jack
Douglas



Leah Lucas
ASU



Kirsten
Genson
IA State

New Member

Kristen
Roskov
U. MD

Mechanics of Complex Interfaces



Chris
Stafford



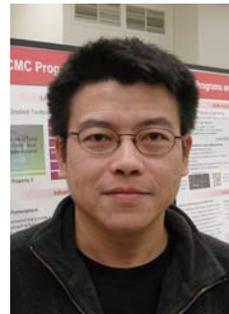
Patricia
McGuiggan



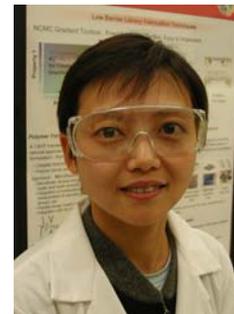
Martin
Chiang



Jae-Hyun
Kim



Xuesong
Hu



Heqing
Huang

New Member

Jun Young
Chung
Lehigh
University

NCMC Research Team



Polymer Formulations



Kathryn
Beers



Susan
Barnes



Chang Xu



Thomas
Chastek



Steve
Hudson

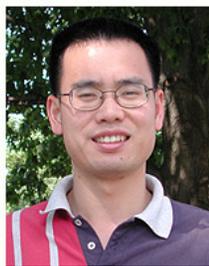
Jesse Yates
Quince Orchard HS

New Member:
Kazunori Iida
Kyoto University
Japan

Team Member Transitions



Thomas
Epps III
University of
Delaware



Tao Wu



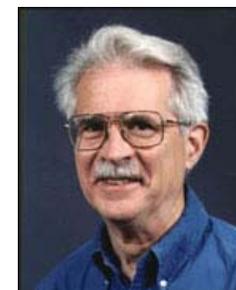
Duangrut
Julthongpiput
Intel



Shu Guo
Dow
Chemical



Jai Pathak
Naval
Research
Lab



Anthony Bur
Blissful
Retirement
(and GR)

New NCMC Outreach Coordinator



Carol Laumeier



Goals of NCMC-9



- Discuss key measurement needs in industrial development and application of nanostructured materials
- Arrive at priority combinatorial and high-throughput measurement methods for nanostructured materials

The NCMC-9 Program:

- **Invited presentations:** elucidate issues in the development, application and measurement of nanostructured materials.
- **NIST presentations:** combinatorial and high-throughput methods pertinent to nanostructured materials.
- **Discussion sessions:** Measurement needs for nanostructured materials

NCMC-9 Program



NIST Combinatorial Methods Center

**NCMC-9: Combinatorial Methods for
Nanostructured Materials**
April 24 - 25, 2006 ♦ Bldg. 101 / Lecture Room B

Monday, April 24, 2006 - Morning

8:15 am Registration
Continental Breakfast

8:45 am Welcome and Introduction
Richard Kayser, Director, Materials Science and Engineering Laboratory, NIST
Michael Fasolka, Director, NIST Combinatorial Methods Center

Industrial Application of Nanomaterials

9:00 am Plenary Lecture
Fiona Case, Case Scientific Inc.
Applications of Nanotechnology in Soft Materials: Cosmetics, Foods, Personal Care, Pharmaceutical and Oil Industries

10:00 am Karl Maurer, CombiMatrix Corp.
Building addressable molecular libraries: combinatorial synthesis and analysis of small molecules on a 12,000 feature microelectrode array

10:45 am Refreshment Break

11:00 am Plenary Lecture
Prof. Daniel Savin, University of Vermont
Light Scattering Techniques for Polymer Materials

11:45 am Thomas Chastek, Polymers Division, NIST
High-Throughput Light Scattering Measurements

12:05 pm Peter Harris, Veeco Instruments
Advanced Scanning Probe Microscopy Techniques

Application, Development and
Measurements of Nanomaterials

Plenary Presentation

Fiona Case, Case Scientific

Industrial Applications of Nanomaterials

Invited Presentation

Karl Maurer, CombiMatrix

Combi Discovery of Nanomaterials

Plenary Presentation

Daniel Savin, University of Vermont

Light Scattering Techniques for Polymers

NIST Presentation

Thomas Chastek, NCMC

HT Light Scattering Measurements

Invited Presentation

Peter Harris, Veeco Instruments

Advanced SPM Techniques

NCMC-9 Program



Monday, April 24th, 2006 - Afternoon

Combi Methods for Thin Nanostructured Materials

- 1:30 pm Invited Lecture
Prof. Sergiy Minko, Clarkson University
Combinatorial approach to the problem of interfacial interactions via gradient polymer brushes
- 2:15 pm Invited Lecture
Prof. Thomas Epps, University of Delaware
Combinatorial Studies of Block Copolymer Interactions with Surfaces
- 3:00 pm Refreshment Break
- 3:15 pm **Alamgir Karim**, Polymers Division, NIST
Nanostructured Materials Group
- 3:45 pm **Christopher Stafford**, Polymers Division, NIST
Combinatorial approaches to nanoimprint lithography

Tuesday, April 25th, 2006 – Morning

- 9:10 am **Steve Fletcher and Jawwad Darr**, InsightFaraday, UK
High Throughput Nanomaterials Discovery - a UK perspective
- 9:45 am **Daniel Cutbirth**, Nscrypt Inc.
Novel Deposition System for Combinatorial Libraries
- 10:20 am Refreshment Break
- 10:40 am **Celesta Fong**, CSIRO, Australia
CSIRO Overview and NCMC Interaction
- 10:55 am **Christopher Stafford**, NCMC
NIST Gradient Flow Coater
- 11:15 am **Michael Fasolka**, NCMC
High throughput preparation of specimens for TEM
- 11:30 am **Chang Xu**, NCMC
Combinatorial Surfaces of Grafted Polymers
- 11:45 am **Brian Berry**, Polymers Division
Orientation in Nanostructured Thin Films

Combi Methods for Thin Nanomaterials

Invited Presentation

Sergiy Minko, Clarkson University
Gradient Polymer Brushes

Invited Presentation

Thomas Epps III, University of Delaware
Combi Studies of Block Copolymer Films

NIST Presentations

Alamgir Karim, Polymers Division
Nanostructured Materials Group

Christopher Stafford, NCMC
Combi approaches to nanoimprint lithography
NCMC Gradient Flow Coater

Mike Fasolka, NCMC
HT preparation of TEM specimens

Chang Xu, NCMC
Combi Surfaces of Grafted Polymers

Brian Berry, Polymers Division
Orientation in Nanostructured Thin Films

NCMC-9 Program



NIST Combinatorial Methods Center

Tuesday, April 25, 2006 – Morning

8:30 am Reconvene
Continental Breakfast

Interactions and Update

9:00 am Michael Fasolka, NCMC
Welcome Back

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Orientation in Nanostructured Thin Films

12:00 pm Michael J. Fasolka
Wrap Up

12:20 pm Lunch (NIST cafeteria, Bldg. 101)

NCMC Tours and Demonstrations

1:45 pm Convene in NCMC Labs – Building 224, Rm. B204
See Lab Tours Handout for Schedule

3:30 pm Adjourn – See you at NCMC-10! (October 5-6, 2006)

NCMC Interactions

Invited Presentations

Steve Fletcher and Jawwad Darr,
InsightFaraday, UK
*HT Nanomaterials Discovery - UK
perspective*

Daniel Cutbirth, Nscrypt Inc.
New combi library deposition system

Celesta Fong, CSIRO, Australia
*CSIRO overview and NCMC
Interaction*

Discussion Session



NIST Combinatorial Methods Center

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Nanostructured Materials Group
- 3:45 pm **Christopher Stafford**, Polymers Division, NIST
Combinatorial approaches to nanoimprint lithography
- 4:05pm *Break*

Discussion Session

- 4:15 pm *Introduction:* Michael Fasolka, Director, NIST Combinatorial Methods Center
- 4:20 pm *Discussion:* Fasolka, Beers, Karim Moderators
Goals:
- *Discuss key measurement needs in industrial development and application of nanostructured materials.*
 - *Arrive at priorities for the development of combinatorial and high-throughput measurement methods for nanostructured materials.*
- 5:15 pm *Adjourn*
- 6:15 pm *Dinner: RSVP Required*
Bugaboo Creek Steak House
15710 Shady Grove Road Gaithersburg, MD
See your handouts for directions from NIST.

NIST Combinatorial Methods Center

NCMC-9: Combinatorial Methods for Nanostructured Materials

Discussion Session on April 24th, 2006.

Goals:

- Discuss key measurement needs in industrial development and application of nanostructured materials.
- Arrive at priorities for the development of combinatorial and high-throughput measurement methods for nanostructured materials.

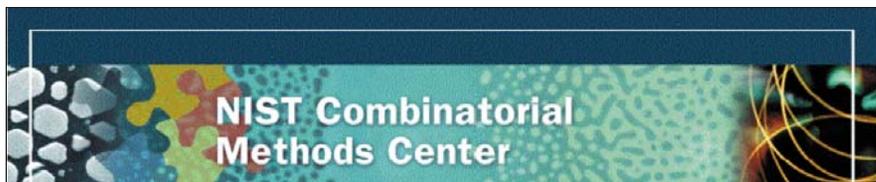
Please be prepared to discuss the following issues. Questions and examples:

1. Scope of Metrology Needs

- A. In your company, what aspects of *nanomaterials* development or application require new or improved measurement methods? Examples to consider:
- **Basic R&D:** design and testing of custom fabricated materials.

- **Format:** Guided Discussion
- **Moderators:** Fasolka, Beers, Karim
- Discussion will address themes and questions provided to attendees ahead of time
- Your input is extremely important to us. Please be prepared to participate and respond.

NCMC-9 Program



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8:30 am Reconvene
Continental Breakfast

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NCMC Facilities Demonstrations

- *Open House Format*
- *See Handout for a Map of Stations*

Ask Our Experts

FLOOR PLAN KEY

1. Preparing gradient films with our flow coater **Mike Fasolka** (B207)
2. Preparing surface energy and chemistry gradients **Mai Juthongpipit** (B207)
3. Microchannel confined surface initiated polymerization (μSIP) and controlled radical polymerization **Chang Xu** and **Tao Wu** (B209)
4. Rapid prototyping of fluid devices for polymer formulations **João Cabral** (B209)
5. Microfluidic suspension polymerizations, Raman and fluorescence spectroscopies, **Tony Bar** and **Zuzanna Cygan** (B215)
6. C&HT Rheology **Jal Pathak** (B215)
7. C&HT peel tests **Patty McGuigan** (B217)
8. Strain Induced Elastic Buckling Instability for Mechanical Measurements (SIEBIMM) **Shu Guo** (B217)
9. C&HT Probe Tack apparatus with image acquisition **Seung-ho Moon** (B217)
10. Multi-lens Contact Adhesion Tests (MCAT1&2) **Chris Stafford** (B217)
11. C&HT scattering methods **Alex Norman** and **Wenhua Zhang** (A212)
12. Library liquid dispenser and MALDI **Michelle Byrd** (A208)

COMBI Facilities

Combi Office (B204)

Adhesion and Mechanical Properties Lab (A212)

Please:



- Consider *Discussion Session* questions during the symposia
- Pick up lunch tickets
- See handouts for directions to dinner
- After the workshop, write us an email with your thoughts on NCMC-9: combi@nist.gov
 - What did we do well?
 - What could have been done better?
 - What capabilities are you interested in?
- Mark your calendars: **NCMC-10: Oct. 5-6, 2006**

THANKS!