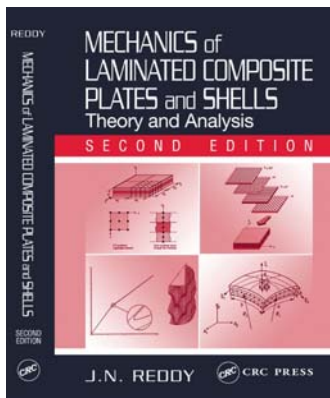


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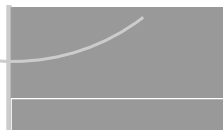


New publication by
J.N. Reddy
PTC Faculty



Polymer

Technology Center



PTC LAUNCHES EFFORT TO COMPETE FOR A NSF MRSEC

PTC has launched an effort to compete for a National Science Foundation (NSF) Materials Research Science and Engineering Center (MRSEC). MRSECs are supported by the NSF to undertake materials research of scope and complexity that would not be feasible under traditional funding of individual research projects. These Centers:

- ✿ Require outstanding research quality, intellectual breadth, and flexibility in responding to new research opportunities, support for research infrastructure, and they foster the integration of research and education in the materials field;
- ✿ Address fundamental, complex problems of intellectual and societal importance;

✿ Contribute to national priorities by fostering active collaboration between academia and other sectors, and

✿ Are the basis for a national network of university-based Centers in materials research.

Three IRG's have been formed to support the effort. The IRG's bring polymer faculty together to address these areas of research:

- ✿ Characterization and Modeling of Polymeric Surface Deformation and Damage at Micro- and Nano-Scales; led by Wayne Hung
- ✿ Integration of synthesis, engineering and computation to understand the nano-scale polymer-particle phys-



ics and their consequences on macroscopic properties and ultimate user applications; led by David Ford

✿ Biomaterials for Engineering Tissues; led by J.D. Humphrey

The PTC is very excited about this opportunity and the future of research that may be supported by this endeavor.

PTC WELCOMES A NEW DIRECTOR

The Polymer Technology Center is pleased to welcome our new Director, Dr. Hung-Jue Sue. Dr. Sue has been a professor of mechanical engineering at Texas A&M for nine years. His professional history also includes a research position with Dow Chemical. Dr. Sue earned his B.S. from Chung Yuan University in Taiwan, and

two M.S.E.s and a Ph.D. from The University of Michigan.

With Dr. Sue's corporate and academic experience, unremitting drive and vision, the dynamics and momentum of the PTC are changing. Faculty members from CHEN, CHEM, MEEN and ETDC are working together on various important polymer topics, such as polymer nanocompo-

sites, polyolefin catalysis, molecular modeling, toughening and strengthening of PP. Hiring for additional PTC faculty members is also underway. It's an exciting time to be a member of the PTC!



MARK YOUR CALENDAR!**April 2004**

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

April 2 - PTIC Spring Conference

April 22 - SCRATCH Spring
Conference (Michigan)**September 2004**

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

September 30 - SCRATCH
Fall Conference**October 2004**

S	M	T	W	T	F	S
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3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

October 1 - PTIC Fall Conference

October 2 - PTC Football Outing
TAMU vs Kansas State
(reserve tickets as soon
as possible)
Contact Kelly Strickland**PTIC SEMI-ANNUAL CONFERENCE - APRIL 2, 2004**

The Polymer Technology Industrial Consortium (PTIC) is conducting its semi-annual conference on Friday, April 2. The PTC has many new and exciting developments to be presented, including:

- ♦ The introduction of new faculty members from MEEN, CHEN, CHEM and ETDC
- ♦ The PTC Game Plan to become a Center of Excellence on Polymers in the SW
- ♦ The PTC competition for a NSF MRSEC
- ♦ World-class polymer research and education

8:50-9:00am	Opening Remarks and Brief Overview
9:00-9:15am	Recent Emphasis on Polymer Research and Education
9:15-9:45am	Interactions, Dynamics, and Structure in Polymeric and Colloidal Systems
9:45-10:15am	Syndiotactic-Hemiisotactic Polypropylene from Metallocene Catalysts
10:15-10:30am	Break
10:30-11:00am	Enhancing Polymer Processing Capability of PTIC
11:00-11:30am	High Crystallinity PP Nanocomposite and Microcomposites for Retort Rack Applications
11:30-11:45am	Functions, Goals, and Activities of the Local Student Chapter of SPE
11:45-1:15pm	Student Poster Session ; Lab Tour; Informal Discussion, etc.
1:15-1:45pm	Soluble Polymers for Surface Synthesis and Catalysis
1:45-2:15pm	Thermophysical Characterization of Polymer Films: Thermal Conductivity and Thermal Contact Conductance
2:15-2:20pm	Numerical Simulation of Pultrusion Process
2:20-2:45pm	Test Method Development for Evaluating Scratch Resistance of Polymers
2:45-3:15pm	NSF MRSEC; New Consortium; Members Inputs; Faculty Recruiting and Program
3:15pm	Individual Meeting with Faculty Members, Student Recruiting, etc.

IT'S A CLEAN SWEEP AT SPE POLYOLEFINS CONFERENCE!

PTC Graduate students take the Gold, Silver and Bronze in the poster competition at the SPE International Polyolefins 2004 Conference.

1st Place

Goy Teck Lim
"Scratch Visibility and Dam-

age Characterization of Polymers"

2nd Place

Yuntao (David) Li
"Ultrasonic Improvement of
Processing LLDPE during
Extraction"

3rd Place

Jongil Weon
"Probing Toughening Mechanisms of Polyolefin Blends Using The Double-Notch Four-Point-Bending Technique"



Congratulations!

ANTEC 2004

Presented in Chicago will be the Best EPSDIV ANTEC Paper Award for 2003. And the winner is... TAMU! K.T. Gam, N. Bestaoui, N. Spurr, A. Clearfield and H.J. Sue for "Preparation and Mechanical Property of Synthetic Zirconium Phosphate-Epoxy Nanocomposites".

Student presenters at this year's conference include:

Jaehyung Ju - "Water Diffusion Based Non-Destructive Evaluation (NDE) of PMR-II-50/M60J 4HS Weave Carbon Fabric Composite Materials under Stress-Thermal Cycling"

Goy Teck Lim - "Assessment of Plastic Failure of Polymers due to Surface Scratches"

Jongil Weon - "Effects of Aspect Ratio and Clay Particle Orientation on the Mechanical Properties of Nylon-6/clay Nanocomposites"

Jonghyun Kim - "Measurement of Sintering Characteristics of Nylon6/clay-reinforced Nanocomposite"

SPE - STUDENT CHAPTER NEWS

The Student Chapter of SPE is planning an end of the year picnic. Date and location to be announced. For updates and information, go to: <http://stuact.tamu.edu/stuorgs/spe/>

SCRATCH SEMI-ANNUAL CONFERENCE - APRIL 22

Our SCRATCH conference will be held at Solvay Engineered Polymers auditorium in Auburn Hills, Michigan. This meeting will introduce a new scratch testing and evaluation methodology to quantitatively analyze the surface damage of polymers due to scratches. The meeting is recommended for polymer scientists and material engineers in the field of polymer processing or product design. If you would like to attend or to obtain more information, contact Kelly Strickland or go to: <http://ptc.tamu.edu>

9:00–9:15am	Welcome and Brief Overview
9:15–10:00am	ASTM Test Standard Review and Updates
10:00–10:45am	FEM Modeling of Scratch Damage of Polypropylene
10:45–11:00am	Tea Break, Courtesy of Solvay Engineered Polymers
11:00–11:45am	Materials Science of Scratch Damage of TPO With and/Without Slip Agents
12:00–1:00pm	Lunch, Courtesy of Solvay Engineered Polymers
1:00–1:45 pm	FEM Modeling of Slip Agent-Induced Surface Deformation and Scratch of TPO
1:45–2:30pm	Polymer Scratch at Nanoscale
2:30–2:40pm	Description of 2 nd Generation Scratcher for Polymer Scratch
2:40–3:00pm	Future Plan, Action Items, NSF Center, Date of Next Meeting, etc.

NEW PTC LAB EQUIPMENT

PTC Scratch Machine is now in its Third Generation!

Through conscientious in-house test-runs and equipment evaluation and design, the third-generation scratch machine retains several important testing functionalities and capabilities of its predecessors listed below as:

- To execute multi-pass and multi-indenter (up to 3 stylus) scratch tests
- To perform constant load (0 – 50N: dead load; 5 – 75N: spring load), constant speed (0 – 400mm/s), increasing load (from 5N to 5 – 75N: spring load) and increasing speed (from 0 mm/s to 0 – 400mm/s) scratch tests
- To conducts scratch tests under different ambient temperatures (-50°C to 100°C).

To allow real-time sensing and data acquisition through the use of in-board sensors and computer

- The sensitivity of the sensor and data acquisition of the scratch machine are given as
 - ★ Normal load (spring load): 0.01N
 - ★ Tangential load: 0.1N
 - ★ Scratch depth: 0.5 μm
 - ★ Scratch distance: 5 μm
 - ★ Scratch speed: 10 $\mu\text{m/s}$

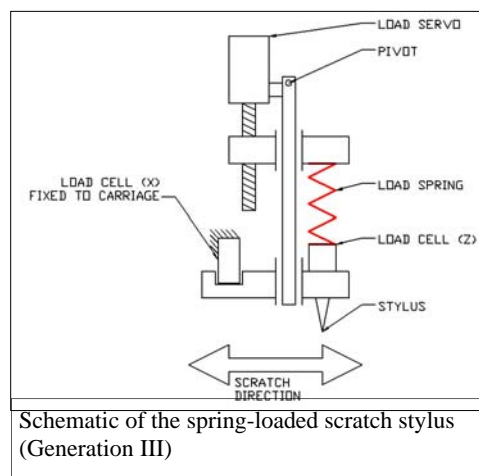
To meet future needs and extend existing testing capabilities, numerous improvements and new designs have been instituted in the third-generation scratch machine that include,

- A Bigger, Wider and More Durable Work Surface - Now twice as large as the previous scratch machines, the work surface gives more rooms to set up specimens for testing and allows specimens of larger dimensions to be used. Being more durable and easier to clean, stainless steel is used instead of aluminum.
- Vibration-damped Work Surface - The work surface has constrained layer damping and an inner support core of honeycomb aluminum. These new designs minimize the detrimental effect of vibrations in polluting test data, especially in low-load testing.
- Lighter but Stiffer and Stronger Scratch Bed - Instead of using aluminum and relatively weaker bolting technique, the scratch bed is made of welded steel. Inherently stronger and stiffer, a welded steel scratch bed helps to achieve higher sensor accuracy, especially in detecting scratch motion. The unique mechanical interlocking assembly of steel plates prior to welding produces a scratch bed that possesses the stability but yet lighter and cheaper than cast iron.

FOR MORE EQUIPMENT INFORMATION, SEE OUR WEBSITE: <http://ptc.tamu.edu>

IN THE NEWS

The new ASTM Standard will be sent to the ASTM Committee for final approval this summer.



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PTC FACULTY ACTIVITY UPDATES

Research Awards in 2004

Michael Bevan was honored with the 2004 NSF CAREER award

CAREER: Direct Measurement and Manipulation of Colloidal Interactions and Dynamics in Template Directed Photonic Crystal Assembly

This proposal is concerned with measurement and manipulation of colloidal interactions involved in the assembly of single photonic colloidal crystals on interfacial templates and in the presence of external fields. The objective is to understand fundamental mechanisms linking colloidal forces and hydrodynamic interactions to formation of thermodynamic structures and kinetic pathways in interfacial "self-assembly" and "driven assembly" processes. A central task in this work is to combine total internal reflection, video, and confocal scanning laser microscopy techniques to measure particle-particle, particle-template, and particle-field interactions in increasingly complex interfacial colloidal systems ranging from single particles to concentrated three dimensional dispersions. Monte Carlo and Stokesian dynamics simulations will be used to understand how to form optimal equilibrium particle configurations and how to control dynamics to avoid kinetic traps. The intellectual merit of the proposed career plan is based on its fundamental significance to manipulating ordered interfacial structures on colloidal length, time, and energy scales, which are inherently intermediate to molecular and macroscopic systems and therefore of utmost importance to nano- science and technology.

"Modeling of Flow of Particulate infused in Fluids", funded by U.S. DOE under the auspices of University Research Partnership Program, 1/1/02/-12/31/04, Co-PIs: K.R. Rajagopal and N. K. Anand, \$210,000. Prorated Share: \$105,000.

Drs. Morgan and Reddy have recently been awarded grants of over \$500,000 from the State of Texas, Advanced Technology Program and Air Force Office of Scientific Research for Characterization and Development of Ultrahigh Temperature Polymers and Their Composites.

Sampling of Publications

Ko, Kang-Hoon and Anand, N.K., "Use of Porous Baffles to Enhance Heat Transfer in a Rectangular Channel," *International Journal of Heat and Mass Transfer*, Vol. 46, pp. 4191-4199, 2003.

Z. Wang, J. Heising, and A. Clearfield, "Sulfonated Microporous Organic-Inorganic Hybrids as Strong Bronsted Acids", *J. Am. Chem. Soc.*, 125, 10375-10383 (2003) .

J.S.S. Wong, H.-J. Sue, K.-Y. Zeng, R.K.Y. LI, and Y.-W. Mai, "Surface Damage of Polymers in Nanoscale", *Acta Mater.*, 52, 431-443(2004).

Z. Xia, T. Hartwig, and H.-J. Sue, "Mechanical Behavior of Bulk Poly(ethylene terephthalate) Subjected to Simple Shear", *J. Macromol. Sci.: Phys.*, B43, 385-403(2004).

A. Tripathi, D.G. Medvedev, M. Nyman and A. Clearfield, Selectivity for Cs and Sr in Nb-Substituted Titanosilicate with Sitenakite Topology, *J. Solid State Chem.* , 175, 72-83, (2003).

A. Tripathi, T. Hughbanks and A. Clearfield, The First Framework Solid Composed of Vanadosilicate Clusters , *J Am. Chem. Soc.*, 125, 10528-10529, (2003)

NEW PTC COORDINATOR

Kelly Strickland has joined the staff of the PTC as the Program Coordinator.

Kelly's background includes hospitality sales, marketing, and meeting and tradeshow planning. She received her BS in Business

Administration from Central Washington University. She and her husband, Ray, and cat, Bump, live in Brenham.

"I'm very honored and excited to be working with Dr. Sue, the faculty and staff, and to share in their vision

for growth and expansion of PTC."

Contact me for all your PTC needs!

