

## From the Director

I recently attended the Marcus Wallenberg Prize ceremony in Stockholm, where Metso was recognized for its metal belt calender. The prize ceremony was a royal event. Even more rewarding to me were the many industry leaders who approached and began the conversation with, "I visited IPC (IPST) and have fond memories of..." Besides our wonderful alumni, there are many friends of IPST across the world, and I'm honored to represent the Institute and you.



*Norman and Maureen Marsolan at the Wallenberg Prize gala dinner*

The Wallenberg Prize and various TAPPI awards act as reminders of the positive impact research and development continue to have in our industry. Industry-sponsored research is on a positive growth curve at IPST. The majority of research support today is in biorefining and in new valuable materials sourced from the tree. One such material is nanocellulose, one of the very few nanomaterials that appears to be health risk free. This attribute was emphasized during the recent dedication of the nanocellulose laboratory at the USDA Forest Service Forest Products Laboratory (FPL). We are benefiting from increased federal research interest in nanocellulose and other advanced forest biomaterials opportunities. IPST has a long history of publishing discoveries in nanocellulose, and we have several current collaborative projects with FPL. Through the IPST Foundation, we also fund a number of student research projects that explore future products and markets for forest biomaterials.

Regarding our alumni, we are working with several members to restart the Institute Heritage Foundation, the IPC/IPST/GT-PSE alumni organization. IPST will co-host an organizational meeting October 11 in Appleton, Wisconsin, and I hope a number of you will be able to attend. We'll report the outcome in future correspondence, and you may also find information in our LinkedIn group for IPC alumni.

At IPST we have strengthened our staff with the selection of Teri Williams as director of the Robert C. Williams Papermaking Museum, the addition of Steve Forsyth in our newly created role of communications manager, and the promotion of Lavon Harper to administrative manager. I'm pleased to have these outstanding individuals participating in making IPST a growing success. There are many others involved as well. Nearly 50 graduate students and 40 faculty and staff contribute to our IPST mission. Included in this newsletter is a brief look into some of the many contributions and people of the Institute.

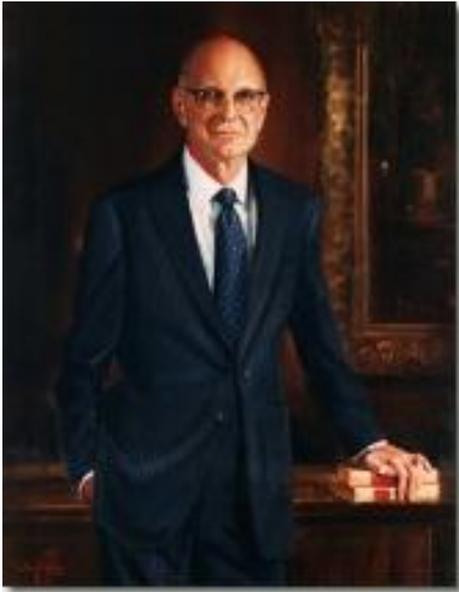
I hope you enjoy.

A handwritten signature in black ink that reads "Norman F. Marsolan".

Norman F. Marsolan, Director



## Haselton Gift Strengthens Endowment Fund



Portrait of William Haselton painted by  
Ann Manry Kenyon

IPST alumnus and former board member William Haselton completed a gift early this year that brought \$1.55 million into the IPST-Georgia Tech endowment fund. The Haselton gift will generate an estimated \$60,000 a year for the benefit of graduate students pursuing degrees in paper science and engineering, specifically to cover tuition, stipends and graduate research.

“This gift from the Haseltons is tremendous for IPST and our students,” said IPST Director Norman Marsolan. “Our existing endowment funds continue to provide a strong base for our research students. This represents significant growth for years to come. We are deeply indebted to the Haseltons and appreciate their commitment to our mission.”

The original gift was a tract of Florida property donated by William and Frances Haselton to IPST in 1995 and recently sold with Dr. Haselton’s cooperation. Income from the endowment will become available beginning in July 2013 (FY2014).

Haselton contributed a substantial monetary gift to the Institute in 1992.

“Several years ago I reached a decision that the Institute had made a major difference in my business career and my life in general,” he said. “And for this reason, I became interested in showing my appreciation in some appropriate and tangible way.” The William R. Haselton Library was dedicated at IPST on April 6, 1993.

Haselton spent his entire career in the paper industry, and was named Papermaker of the Year in 1982 and Packaging Man of the Year in 1989. After graduating from the Institute in 1953, Haselton joined the staff of Rhinelander Paper Company as technical director. When Rhinelander was acquired by St. Regis Paper Company in 1956, Haselton went on to assume a variety of positions in the new company, including vice president and general manager of the forest products division and senior vice president for timberlands and forest products. He was named executive vice president of operations in 1958, responsible for all operations of the Rhinelander plant.

*Over the years, there’s never been a doubt in my mind that choosing the opportunity for graduate study at the Institute was an extremely key element in what turned out to be an interesting and rather successful lifetime involvement with the forest products industry. I have to say it was one of the most stimulating and most rewarding and most interesting experiences of my life.*

— Dr. William R. Haselton, April 3, 1993

He served as president and chairman of the board of the National Forest Products Association and was a member of the executive committee of the American Paper Institute. Haselton was also a member of the IPST Board of Trustees from 1979 through 1988, serving on the executive committee and as chairman of the finance committee

Haselton was elected Director of St. Regis Paper Company in 1972 and President in 1973. In 1979, he was elected Chief Executive Officer, and he was named Chairman of the Board in 1981. When St. Regis merged with Champion International Corporation in 1984, he became Vice Chairman and a member of the board of directors.

Now retired and living in Florida, Haselton’s contributions to the United States pulp and paper industry have been significant.

## **Eight New PSE Fellowship Awards Announced**

The Paper Science and Engineering Faculty Committee is granting eight new PSE fellowship awards beginning this fall, in addition to the four announced previously. The committee reviewed a total of 27 applications. Proposals were required to align with the strategic priorities of the forest bioproducts industry. Of the 12 awards this year, two are in Chemistry, four in Chemical and Biomolecular Engineering, four in Material Sciences Engineering and two in Mechanical Engineering. All of this year's awards are for doctorate work.

"I thank everyone who submitted a proposal and wish that we could support all of the excellent research projects submitted," said IPST Director Norman Marsolan. "These fellowship awards represent a wide variety of topics, all of which are relevant to our forest bioproducts industry."

The newly announced fellowships include:

- Direct Analysis and Tracking of Crystal Formation in Black Liquor Evaporators – Dr. Cyrus Aidun, ME
- Novel Liquid-Phase Plasma Technology for Fatty Acids and Microstickies Removal in Waste Water Treatment and Deinking of Inkjet Printed Paper – Dr. Jeff Hsieh, ChBE
- Optimal Resource Balancing and Factory Loading for Energy Cost Reduction in the Pulp and Paper Industry – Dr. Roger Jiao, ME
- Carbon Fibers from Lignin/Carbon Nanotube (CNT) Composites – Dr. Satish Kumar, MSE
- Enhancing Cellulose Reactivity for Dissolving Grade Pulps via Pulping – Dr. Art Ragauskas, Chem
- Mechanisms and Control of Erosion Corrosion in Evaporators and Concentrators – Dr. Preet Singh, MSE
- Low-Cost Carbide-Derived Carbons for Absorptive Removal of VOCs from Air Streams – Dr. Krista Walton, ChBE
- Near-dry Forming of Paper/Pulp Products with a Viscoelastic Aqueous Polymer Solution – Dr. Donggang Yao, MSE, Dr. Yulin Deng, ChBE.

## **IPC Foundation \$10,000 Prize Offered This Year through GTRIC Competition**

IPST again will administer a \$10,000 prize from the Institute of Paper Chemistry (IPC) Foundation in conjunction with this year's Georgia Tech Research Institute Conference (GTRIC), to be awarded for the highest score among Innovate Competition entries that relate to advancing the horizons of the forest bioeconomy. Abstracts are due by 6 p.m. October 16, and the award will be presented at GTRIC ceremonies on February 12, 2013. This is the second year for the award sponsored by the IPC Foundation.



*Foundation Prize trophies*

In addition, two \$5,000 fellowships will be awarded for students in the poster competition whose proposals relate to paper science.

The object of the competition is to create innovations in forest bioproducts, including advances in manufacturing technologies. The topic areas include innovations in biomaterials, biofuels and chemicals that advance the horizons of the forest bioeconomy. Last year the \$10,000 prize went to Jie Wu, who won the innovation prize in the category for his project, "Highly-Scattering, Nanostructured Optical Coatings for Sustainable Paper and Paperboard Products".

The Foundation also awarded \$5,000 prizes for poster presentations to Yan Li for "Microstructure-based Evaluation of Material Fracture Toughness" and to John Copeland for "Interactions of Biomass Molecules with Heterogeneous Catalysts in Aqueous and Vacuum Environments".

Interested students may get more information at <http://sga.gatech.edu/graduate/GTRIC>.

## IPST Staff Changes



**Teri Williams** is the new Director of the Robert C. Williams Papermaking Museum, promoted from Acting Director. She joined IPST in 2001 and previously was the museum Curator and Assistant Director. Teri has worked as an administrator in the Atlanta arts and museum communities for more than 20 years, most notably as the director of the School of Art and Design Galleries at Georgia State University, and New Visions Gallery, a non-profit gallery initiated by the City of Atlanta. She also has served as a juror and panelist for regional, state, and local agencies and competitions and as a board member of several non-profit arts organizations. The Governor's Commission on Women in the Arts recognized Teri in 1997 for her contributions to the arts in Georgia.



**Steve Forsyth** has communication, marketing and event responsibilities in the new Communications Manager position at IPST. His duties include newsletter production, web communications, event management and promotion of IPST internally and externally to key audiences. He also manages the IT group. Steve has an extensive background in corporate and agency public relations, media relations and community affairs. He has been a resident of the Atlanta area for 18 years, working for Delta Air Lines and Global Aviation Holdings. He is an accredited member of the Public Relations Society of America, Treasurer of the Communication Leadership Exchange, and has taught public relations at the University of Wisconsin – Madison.



**Lavon Harper** has been promoted to Administrative Manager from her previous position as Senior Administrative Professional, reporting to IPST director Norman Marsolan. She has worked at IPST since 1993 and is now responsible for supervising and coordinating all administrative services at IPST. She came to IPST after six years with SAE Carlson in Atlanta.

## Alumni Invited to Institute Heritage Foundation Meeting Oct. 11

IPST and the Institute Heritage Foundation, the alumni association for graduates of the Institute of Paper Chemistry (IPC), the Institute of Paper Science and Technology (IPST), and Georgia Tech Paper Science and Engineering, are co-hosting an information session in Appleton, Wis., on Oct. 11. All alumni are invited. The session, from 4 to 5 p.m., precedes the annual Paper Hall of Fame Awards ceremony at the Radisson Paper Valley Hotel.

The Institute Heritage Foundation objective is to serve alumni by engaging former students in active and effective partnerships with the IPST community and the industry. Governed by alumni, for alumni, the Foundation promotes mutually beneficial interaction among alumni and the current student body and offers the opportunity to build Institute friendships that will last a lifetime.

Anyone interested in participating may reply by contacting [alumni@ipst.gatech.edu](mailto:alumni@ipst.gatech.edu).

## Phil Jones Receives Distinguished Service Award



*Phil Jones*

IPST friend and frequent collaborator Phil Jones of Imerys (formerly English China Clays) received the Herman L. Joachim Distinguished Service Award at the 2012 TAPPI PaperCon conference for exemplary contributions to the advancement of the association.

Jones also served as vice chair of the Industry Advisory Board of CPBIS. He has been a TAPPI member since 1980, where his initial work was in coatings and graphic arts. He has served in numerous TAPPI roles and currently is vice chair of the new Nanotechnology Division, which he helped to form.

## Paper and Tissue Producers Plan to Leverage Energy Crops



Georgia Tech's Institute of Paper Science and Technology (IPST), in collaboration with Kimberly-Clark Corporation, conducted a workshop on the use of non-forest or alternative-sourced fibers for fiber-based products. Entitled "Opportunities and Challenges in the Utilization of Alternative Fibers: A Sourcing, Environmental, Economic and Policy Discussion," the workshop brought together experts from government, universities, representatives of environmental non-governmental agencies and the public sector to explore the implications of large-scale use of alternative fibers. The workshop sessions reviewed alternative fiber sourcing and conversion

technology, environmental and economic impacts from non-forest fiber generation and use, and the policy and regulatory issues of alternative fibers.

A common theme throughout the conference was the opportunity to leverage for the paper and tissue markets the investment and development being made in energy crops for biofuel production. The fiber from these non-wood agricultural crops, which was designed for conversion to biofuels such as ethanol, would be available in large quantities for the production of paper products. The Workshop participants agreed that synergy could exist among paper and energy markets. Life-cycle analysis of the impact on water and carbon cycles, including GHGs, was agreed to be an important contribution toward assessing environmental impact and policy debate.

Led by Dr. Valerie Thomas of ISyE and Dr. Norman Marsolan of IPST, the workshop took place Aug. 28, 2012, in Atlanta. Twenty-four representatives from four companies, two NGOs, three Federal and State organizations, and four universities discussed the challenges and opportunities of sourcing paper and tissue from non-forest fiber. Georgia Tech's core industry research center of the Institute of Paper Science and Technology hosted this gathering of thought leaders to provide new and valuable insights for those involved in the production of alternative fiber-based products.



*Norman Marsolan and Valerie Thomas*

The workshop supports IPST's mission of providing world class research and knowledge to the fiber-based industry ([www.ipst.gatech.edu](http://www.ipst.gatech.edu)). Kimberly-Clark supported and participated in the workshop to further its understanding of alternative-fiber sustainability as part of a commitment to achieve a 50% reduction in its use of wood fiber from natural forests by the year 2025 (<http://investor.kimberly-clark.com/releasedetail.cfm?ReleaseID=683471>).

## Marsolan Attends Wallenberg Symposium



*King Gustaf awarding the 2012 Wallenberg Prize to Mika Severi Viljanmaa*

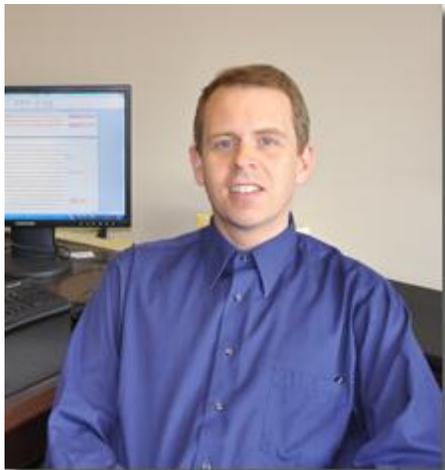
IPST Director Norman Marsolan attended the Marcus Wallenberg Prize ceremony and symposium October 1-2 in Stockholm, Sweden. His Majesty Carl XVI Gustaf, King of Sweden, presided at the gala dinner. The prize was established in 1980 through a donation from the shareholders of Stora Kopparbergs Bergslags AB in honor of the company's retiring chair, after whom the prize is named. This year, the recognition was awarded to Mika Viljanmaa for his work on "Resource-Saving Metal Belt Calendering."

Marcus Wallenberg, grandson of the founder and current chair of the Wallenberg Foundation as well as chair of SEB of Stockholm, introduced the symposium. The theme of the scientific event was "Efficient Fibre Utilization—A Response to the Global Wood Supply Situation." Laureate Viljanmaa presented his research. Other reviews included "Forest Sector Transformation: Maximizing Value from Canada's Forest Resource," by Forest Products Association of Canada executive vice president Catherine Cobden; "Multi-Layer technology in Paper-Making," by Daniel Söderberg of Innventia; and several others. Videos of the events can be accessed at <http://mwp.fabrik618.se> (click on Symposium 2012).

In reflecting on the meeting, Marsolan mentioned speakers' repeated references during the course of the sessions to the forest products industry's conservatism. Several speakers with financial expertise urged the industry to look more critically at new investment possibilities, and to be more willing to take prudent risks. Speakers acknowledged the need to be good stewards of corporate capital while noting the need to respond to the changing future marketplace.

IPST professor Art Ragauskas also attended the dinner.

## Carsten Sievers Researches Improved Biofuel Production through Process Development and Stabilized Catalysts



*Carsten Sievers*

IPST faculty member Carsten Sievers, D.Sc., a Georgia Tech assistant professor in the School of Chemical and Biomolecular Engineering, is focused on developing processes for the production of fuels and chemicals from biomaterials. In his view, becoming competitive will require the same understanding for biomass conversion that the petroleum industry has developed over the last 150 years. Conversion of biorenewable feedstock is more difficult and Carsten feels that, if the biofuel industry is not at least as proficient, it will be hard to compete. He is working with Dr. Pradeep Agrawal to further study gasification of feedstock such as switchgrass, pine and corn stover. He is interested in the gasification of these feedstocks and the chemical composition changes that occur during the gasification process. Further studies will utilize the IPST high-pressure gasifier now located in the new Carbon Neutral Energy Solutions (CNES) building on North Avenue. Georgia Tech is one of only a few universities that can conduct gasification under high-pressure conditions that are relevant for large-

scale industrial processes.

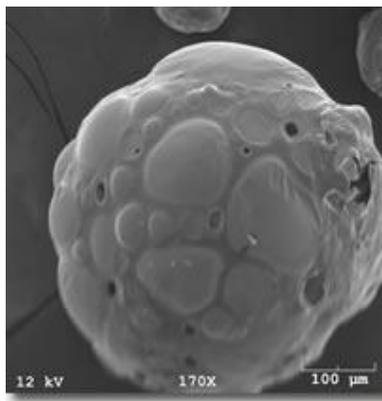
His research is focused on process fundamental, detailed research that can serve a One of his largest projects is a study of the performance of catalysts in the presence of hot for gas-phase reactions, and water at 200 Carsten is leading one of the first groups catalytic structures in hot water and to develop

Carsten's second major body of work involves processes. Spectroscopic studies allow viewing occur. While comparable studies in vacuum in water. Carsten says this technique may be surface interactions – for example, coating applications.

His other areas of study include:

- Upgrading of pyrolysis oils to remove oxygen and turn them into useful fuel additives – This process makes the oils more stable and increases energy content. The goal is to develop cheap catalysts that don't require toxic gas treatments.
- Improve syngas production through the use of catalysts – Carsten's research is seeking catalysts that can break down small amounts of oil in gas after gasification, to produce more syngas. The challenge is that the process occurs at very high temperatures and catalysts are needed that will be stable at those temperatures.
- Sugar solution from biomass – Carsten is doing work to help make cheap sugar solution from biomass, and to maximize the amount of sugars formed through solid catalysts.

Carsten also serves as Vice President and President-Elect of the Southeastern Catalysis Society and is Program Chair of the ACS Division of Catalysis Technology and Engineering. He currently manages six graduate students and one post-doctorate researcher at IPST and Georgia Tech. He has been an assistant professor at Tech for three years. His background includes technical chemistry in Germany, specifically involving catalytic and process chemistry for the petrochemical industry. He researched various oil refining processes and developed superior catalysts for that industry.



*Char particle from gasification work*

development – providing practical purpose and be sustainable. stability of catalysts, in particular the water. Most catalysts were designed degrees is a very aggressive medium. worldwide to study the changes of strategies to stabilize these catalysts.

the surface chemistry in these of reactions on the surface as they are common, they are more difficult fully applicable to study various procedures for industrial

## Faculty Recognition



*Professor Art Ragauskas*

### Professor Art Ragauskas Named to Board of IAWS

Professor Art Ragauskas has been named to the Board of the International Academy of Wood Science, the worldwide academy encompassing scientists and institutions working on all aspects of wood science. He has been an IAWS Fellow since 2003.

## Nanocellulose Films to Be Studied for Printed Flexible Electronic Displays



*Professor Bernard Kippelen*

Recently, we were notified that the USDA Forest Service selected a research project for printed flexible electronic displays. The unique aspect of the project is the use of nanocellulose films as the printed substrate. Principal investigator Dr Bernard Kippelen of the School of Electrical and Computer Engineering and the Center

for Organic Photonics and Electronics, submitted the proposal entitled "Chemical Tailoring of Nanocellulose for Printed Optoelectronic Applications." The program is aimed at developing materials and processes that will enable organic solar cells, organic field effect transistors, and organic light-emitting diodes to be fabricated on low-cost, lightweight, sustainable nanocellulose substrates. Dr Kippelen became interested in cellulose substrates after meeting industry members during the 2011 IPST executive conference.

## SAGA Highlights Conversion of Lignin into Biofuel



The Swedish American Green Alliance (SAGA) recently highlighted graduate student research directed at converting lignin from

wood into biofuel. Building upon past and current interactions with Swedish researchers, Professor [Art Ragauskas](#) and graduate student Tyrone Wells are using their knowledge in lignin to develop biological treatments that convert this resource into fats for biodiesel. [Tyrone](#) is a graduate research student in the School of Chemistry and Biochemistry. The SAGA partnership was launched in February 2010 between the U.S. Embassy in Sweden and the Government of Sweden.

## Weyerhaeuser Appreciates GIT, IPST Support



IPST involvement with the Weyerhaeuser Columbus (Miss.) Cellulose Fibers Mill in 2011 earned recognition from Professor Marilyn A. Brown, Georgia Tech School of Public Policy, following a recent letter received from Kent Walker, Vice President-Mill Manager.

Mr. Walker said a Georgia Tech visit to his mill provided a catalyst that generated extra resolve for them to keep pushing for a biomass-based cogeneration system. TVA has approved a 20MW Renewable Power Purchase Agreement with the company, which will allow them to receive revenues for the power they generate beyond their local needs.

"I certainly recognize that the opportunity to participate in these agreements is both directly and indirectly led by visionaries like yourself who help educate and promote these win/win renewable energy partnership opportunities," Mr. Walker stated in his letter to Prof. Brown. IPST was cited specifically by Prof. Brown because Gyungwon Kim, who is on their project team, was an IPST intern at the time of the Weyerhaeuser visit.

## Design of Nanobiomaterial from Renewable Resources Could Increase Applications

Increasing emphasis has been placed on the use of renewable resources, to rely less heavily on petroleum and to better utilize global energy needs. However, the lack of rigidity of nature's materials typically limits their mass production for high-tech applications.

One promising approach to address this shortcoming is to introduce a composite material reinforced by high purity nanofibers found in nature. Cellulose nanowhiskers (CNWs) could integrate a viable nanofibrous porous candidate, resulting in superior structural diversity and functional versatility for diverse applications.

Inspired by these fascinating properties of CNWs, a fully cellulose-based composite was designed using CNW reinforcement and oriented morphology. Comparable to carbon nanotubes or Kevlar filler, CNWs introduced significant strength and directional rigidity to the composite even at 0.2% by weight, yet doubled that under a weak magnetic field of 0.3T. A designed green nanobiomaterial with an enhanced microstructure performance could potentially increase the applications of cellulose-based materials in biomimetic design.

For her research in this area, IPST doctoral student Parisa Pooyan received a \$1,500 travel award for "Outstanding Poster Presentation" at the Georgia Tech Research and Innovation Conference in 2011. Her work, titled "Fabrication of a Cellulosic Nanocomposite Scaffold with Improved Supermolecular Structure as a Potential Cardiovascular Tissue-Engineered Graft," by Parisa Pooyan (ME, MSE), Prof. Rina Tannenbaum (MSE), Prof. Hamid Garmestani (MSE), and Prof. Cyrus Aidun (ME), was among 30 entries selected from 400 applicants.



Parisa Pooyan

Parisa previously received top recognition at the Biological Materials Science Symposium in Orlando, Fla., and Best of 2012 TMS Show in All Graduate Materials Divisions. Her recent work also was presented and accepted for publication at the 2012 ISDT conference, titled "Design of a Nanobiomaterial from Renewable Resources," by Parisa Pooyan, Prof. Rina Tannenbaum and Prof. Hamid Garmestani, in *Integrated Systems, Design & Technology – Knowledge Transfer in New Technologies*, Springer Book Chapter, 2012 ISDT Conference, Mallorca, Spain.

## Matyas Kosa Studies Direct and Multistep Conversion of Lignin to Biofuels

Lignin is the second most abundant biopolymer on Earth, after cellulose, with a highly complex chemical structure that hinders its possible utilizations. Applications that utilize lignin in different manners are of great interest, due to its inexpensive nature. Present work is based on the notion of converting lignin into different biofuels that have only a few, however important, advantages over lignin as a direct energy source. Matyas Kosa has completed his dissertation regarding lignin conversion under the direction of Professor Art Ragauskas, with the following information from his abstract.



Matyas Kosa

The first part of current work (pyrolysis) details the analysis of lignin from a relatively new lignin isolation process called LignoBoost. It is obtained from the pulp and paper industry via CO<sub>2</sub> precipitation of lignin from black liquor (BL). This method is environment friendly, results in lignin with minimal oxidation, eliminates the main bottleneck of the Kraft cycle (recovery boiler capacity), and yet leaves enough lignin in the process stream to recover pulping chemicals and generate energy for the pulp mill. Pyrolysis had converted this lignin into bio-oil with high aliphatic content and low oxidation level, all advantageous for application as liquid fuel.

The second part of this dissertation proved the theory that lignin degradation and lipid accumulation metabolic pathways can be interconnected. Gram-positive *Rhodococcus opacus* species, DSM 1069 and PD630 were used to evaluate lignin to lipid bioconversion, starting with ethanol organosolv and Kraft lignin. This conversion is a first step in a multistep process towards biodiesel production, which includes transesterification, after lipids are extracted from the cells. Results clearly indicated that the lignin to lipid bioconversion pathway is viable, by cells gaining up to 4% of their weight in lipids, while growing solely on ethanol organosolv lignin as a carbon and energy source. Bench-top (2L) scale fermentation using high extractive content (20%) Kraft lignin and DSM 1069 cell line was even more successful. The lignin loss was approximately 30% within the first 24 hours, while the extractive content of the Kraft lignin only decreased by 3%, indicating that the cell growth (80x weight increase in 24 hours) was mainly supported by lignin.

Experiments with PD630 cell line, using the same Kraft lignin in shake flask fermentations, showed clear indications for the metabolic pathway used in the process, such as degradation of lignin, de-methylation of mono-aromatic units (guaiacol-resembling degradation products) and oxidation of lignin. Overall, *Rhodococcus opacus* proved to be promising bacteria to be the focal point of lignin to lipid bioconversion research.

## TAPPI Chapter Elects Officers



Congratulations to the new IPST Chapter TAPPI officers for 2012-2013. President is Fan Hu; Vice President, Yushu Wang; Treasurer, Qining Sun; Secretary, Ying Liu; Public Relations, Xiaodan Zhang; and Event Manager, Xianzhi Meng.

IPST supports the dues of its TAPPI student chapter members, in recognition of the valuable networking and educational advantages of participation.

## Xiaodan Zhang a Finalist in Fiber Society Competition



Xiaodan Zhang

Xiaodan Zhang was selected as a finalist in the annual Fiber Society Graduate Student Paper Competition for her paper entitled "*Flexible and Transparent Fiber-based Ionic Diode Fabricated from Oppositely Charged Microfibrillated Cellulose.*"

Xiaodan's research is directed by Dr. Yulin Deng.

She was notified by Dr. Michael Ellison of the Fiber Society, and is invited to present her paper in Boston Nov. 7-9.

## Changes Coming at Robert C. Williams Museum of Papermaking

Georgia Tech is preparing to begin the repair and restoration of the permanent Robert C. Williams Museum of Papermaking gallery space. Over the past several years, the museum wing of the building has been settling and separating from the main structure. The stabilization process will be extensive and should take approximately four to five months. During this period, the permanent exhibition will be housed and presented in changing exhibition space, allowing it to remain open to group tours and the public. Construction bids have been reviewed and a contractor has been selected.

In addition to the appointment of Teri Williams as director, the museum has initiated a search to fill the position of education coordinator, formerly held by Fran Rottenberg, who retired recently.

Watch for the museum's new website, expected to be launched by the end of this semester. Everyone is invited to follow the museum on Facebook to keep up with current information.

## New Ultra-high Pressure Homogenizer Produces Nano-sized Cellulose Fibers



*Nano DeBee Homogenizer*

A new Nano DeBee ultra-high pressure homogenizer has been installed in Dr. Yulin Deng's IPST lab to produce nano-sized cellulose fibers. The instrument is capable of fibrillating regular, micro-sized cellulose fibers to nano-sized fibers. The device forces the cellulose solution through a small-diameter nozzle at upstream pressures of up to 30,000 psi. Due to the high pressure and the small nozzle diameter, the shear rates on the cellulose solution are extremely high. These conditions result in a high degree of fibrillation to the cellulose material, reducing it to nano-sized cellulose fibers. The nanofiber will be used for various research projects at IPST.

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