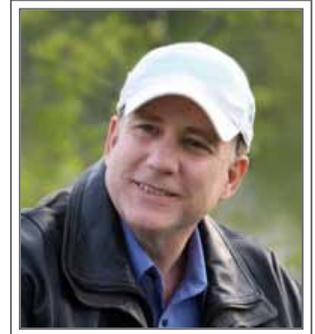


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INSIDE VT WOOD

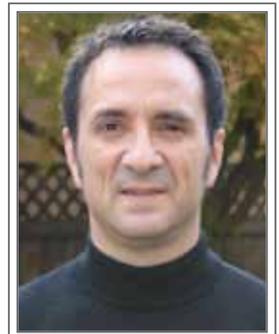
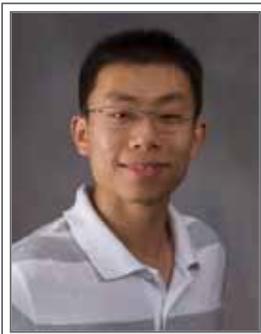
Hello from Blacksburg, Virginia,

The spring flowers are out, and Blacksburg is greening up. The Department has also been “greening” as well, and there are many new activities developing in the Department of Wood Science and Forest Products. You can read in this issue about a study-abroad trip for students that Dr. Henry Quesada organized and ran in Costa Rica for his “Global Issues in Sustainability” course. Two other study abroad efforts to New Zealand and Ireland also just were completed, and we’ll look forward to reports on those trips with students in coming issues of InsideVT Wood. We also showcase efforts in this issue for new ways of using cellulose from wood in enhanced drug delivery systems, and highlight work on some new Packaging Systems and Design research focused on recyclable, green, sustainable biomaterials. It is great to see all this new work as the Department continues to grow while maintaining its traditional roots in wood and wood products.



On other fronts, our graduate student award ceremony was just held this past week, with the A. B. Massey award going to Mathias Schmitt, the Outstanding Master of Science award going to Christian Fricke, and the Outstanding PhD award going to Qingqing Li . A new award this year, the Outstanding Teaching Assistant award went to Amy Jahnke. Outside the Department, the Composite Panel Association’s Robert E. Dougherty award went to Robert Haupt. Christian Fricke also received the Outstanding Master of Science Award for the College of Natural Resources and the Environment. We celebrate the outstanding achievement of these students and all the fine work being conducted in the Department by all of our graduate students with our faculty. Every day when I walk through Cheatham Hall or the Brooks Laboratory to talk with the faculty and students about their work, I see the excitement and enthusiasm for that work, knowing that they are finding new and better ways to grow the economy and help people in the Commonwealth and the world. Please feel free to contact me via email or phone anytime.

Barry Goodell



Departmental Graduate Student Awardees: From left to right – Mathias Schmitt, Qingqing Li, Amy Jahnke, Christian Fricke, and Robert Haupt.



Dr. Kevin Edgar

Dr. Kevin Edgar has been with the Department for about 5 years now, and joined us from Eastman Chemical Company as a Professor of Biomaterials. He leads the Bio-based Materials and Processing Group under Institute for Critical Technologies and Applied Science (ICTAS), and he is also the Associate Director for Research Initiatives in the Macromolecules and Interfaces Institute (MII). Kevin's work is an example of how the field of Wood Science and Forest Products has diversified over the years. It is a credit to the excellence of Dr. Edgar's research that he was elected as an American Chemical Society Fellow in 2009-2010.

[Podcast: Kevin discussing his research](#)

Edgar Research Lab Profile

We understand well how to make good use of wood; we can craft it into shelters, turn it into beautiful and functional pieces of furniture, burn it to keep us warm in the winter. We are coming to understand that wood and other plant materials can be a source of transportation fuel for the future, as fossil fuels become scarce, get expensive, and as burning them drives up atmospheric carbon dioxide levels. But perhaps not all of us appreciate that present and future biorefineries based on trees and other plant materials aren't just sources of cellulosic ethanol to power our cars, but also of advanced materials to enrich our lives and enhance our economy. The students of Professor Kevin Edgar in the Department of Wood Science and Forest Products are helping to create those new materials, based on cellulose and other polysaccharides from nature, which will lead us

to a sustainable future. Much of their research has to do with the design and synthesis of new materials based on cellulose, enabling advanced drug delivery systems which can greatly improve the performance, lower the cost, and reduce the side effects of a wide variety of drugs. Edgar's students are studying ways to improve the delivery of life-saving medications to the human body, to address serious global threats such as tuberculosis, HIV, and cancer. The new drug delivery systems based on these renewable polymers from nature can reduce the amount of drug needed, and thus the cost of treatment for patients around the globe. They can make it possible for patients to take their medication as a convenient pill rather than a painful injection, at the same time permitting economical out-patient therapy.

Edgar's students are also studying better, more precise ways to make these derivatives. Selective modification of natural polysaccharides is difficult due to their great complexity and relatively low reactivity. Edgar's students are developing methods to overcome these barriers and make derivatives with near perfect selectivity, giving us the ability for the first time to understand in detail the relationship between the nanostructure of these important materials, and the properties that they can bring to important products like flat screen displays, drug delivery systems, and coatings for objects ranging from cars to houses. This understanding can be used to adjust manufacturing processes and products to enhance performance and permit the development of new applications and markets.



VT Students learn about Sustainability in Costa Rica

By Henry Quesada

Under the guidance of Dr. Henry Quesada of the Department of Wood Science and Forest Products at Virginia Tech, six students from the Colleges of Agriculture and Natural Resources and Environment at Virginia Tech visited Costa Rica from March 5 to March 14, 2011 to learn about sustainability in a global context.

The study abroad excursion is a core part of the course (WOOD-3954) *Global Issues in Sustainability*. This course has as a goal to provide students with opportunities to understand how natural resources such as the forest, wild life, and water interrelate with economic development, society, and human behavior in developing countries.

During the 9 day excursion the students had the opportunity to visit several national parks, industries, and natural attractions to experiment, learn, and reflect on the interactions of humans with natural resources. Also the students received several lectures from Costa Rica Tech professors and local entrepreneurs on the status, current use, and future of natural resources. After the trip, students have indicated that this course has created new positive attitudes and behaviors about sustainability and they feel more empowered and motivated to apply what they learned into their own local contexts



Global Issues in Sustainability 2011 class posing near the Arenal Volcano in La Fortuna, Costa Rica. From left to Right: John Owen (Geography), Kris Kelleher (Wood Science), Justin Morrison (Geography), Stacey Mayhugh (Ag. Economics), Tory Dandridge (Wild Life), and Vance Nepomuceno (Wild Life)

Triad Packaging, Inc Visits the Department of Wood Science and Forest Products



Mike McFerrin (Triad Packaging, Inc CFO/COO) answers student questions about the corrugated packaging industry

Students in Dr. Bush's *Principles of Packaging* course and Dr. Kim's *Paper and Paperboard Packaging* course met with representatives from Triad Packaging, Inc. (www.triadpkg.com) on March 17th. Triad Packaging CFO/COO, Mike McFerrin and Marketing Manager Tina Hogue discussed the corrugated packaging industry with the students and described opportunities for employment in the field.

Triad Packaging, Inc. is a corrugated fiberboard converting and printing business with locations in Bristol, Tennessee and Gastonia, North Carolina. The company makes several types of corrugated packaging products but specializes in retail point-of-purchase displays. The company has sales of approximately \$15 million annually and employs 75 people. Ms. Hogue and Mr. McFerrin are interested in hosting an intern from Virginia Tech and plan to help with our recruiting efforts.

Students learned about the structure and size of the corrugated packaging industry, careers in the industry, and about recent trends. Trends include a growing emphasis on sustainability in packaging products, changing raw material (board) types, and “zero-crush” manufacturing technology.

The visit was arranged by Dr. Kim and was supported by the International Corrugated Packaging Foundation.

WS&FP Packaging Students Participate in International Corrugated Packaging Foundation Teleconference

By Bob Bush

Students and faculty members involved in the Virginia Tech packaging program participated in the recent International Corrugated Packaging Foundation (ICPF) *12th Annual Careers in Corrugated Teleconference* on February 23, 2011. The live event originated from Michigan State University and included students at seventeen colleges and universities across the U.S. and Canada. Participation in the 2011 teleconference broke all previous records and Virginia Tech was well represented.

The teleconference helped students understand opportunities and career paths in the world of packaging – with emphasis on careers in the corrugated fiberboard producing and converting industries. Mr. Doug Bosnik, President and CEO of Buckeye Corrugated, Inc., described the structure of the corrugated packaging industry and how businesses in the industry operate. Mr. Patrick Smorch, Director of Packaging Sustainability for Georgia-Pacific, described how corrugated packaging companies are helping their customers develop sustainable solutions to their packaging needs. Following the presentations, an industry panel answered questions posed by students at each college or university.

The teleconference ended with presentations by two student design teams. These teams were the two finalists in the ICPF “Best of the Best” packaging design competition and each had developed a corrugated packaging system that would allow for both shipping and retail display of a specific cosmetic product. The winning team was announced live on the teleconference.

Virginia Tech packaging students enjoyed seeing their counterparts at other universities and gained considerable insight from the presentations. Also, the conference excited them about participating in packaging design competitions.



Students Awarded Travel Support

Graduate students Carter Fox and Daiqiang Xu were recently awarded Chevron-Phillips Chemical Professional Excellence travel awards, for their upcoming trip to Anaheim, California to present at the American Chemical Society national meeting in late March. These awards are administered through Virginia Tech's Macromolecules and Interfaces Institute. Xu is pursuing his Ph.D. in Chemistry, and Fox his Ph.D. in Macromolecular Science and Engineering. Both will be presenting about their work on the synthesis of novel cellulose derivatives and the development of novel cellulose chemistry. Both students work in the group of Professor Kevin Edgar.

Timo Grüneberg Joins the Department

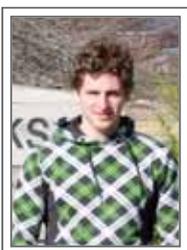
By Urs Buehlmann



Timo Grüneberg recently joined our department as a postdoctoral associate. Timo grew up in a family business for woodworking and carpentry and received a degree as cabinetmaker. He also received a degree in Wood Engineering from the Applied University of Hildesheim and a Master's in Wood Biology from the Applied University of Rosenheim, Germany. He completed his doctoral studies on the evaluation and optimization of properties of Wood Polymer Composites using chemical wood modification in 2010 at the Georg-August-Universität, Göttingen, Germany.

Timo works with Dr. Buehlmann on the optimization and improvement of the ROMI 3.0 Roughmill Operator, the USDA Forest Service's rough mill yield optimization program. Timo's office is located at the Brooks Center and he can be reached at tgruene2@gmail.com.

Michael Sperber Joins the Department



Michael Sperber, an undergraduate student studying engineering at the University of Applied Sciences Rosenheim, Germany has joined the Lean@Virginia Tech team as a one-year trainee. Michael will focus on advancing the agenda of the LeanTeam and support the organization of the ISCHP3 2011 conference. He will report to Urs Buehlmann.

In his spare time, Michael enjoys playing the guitar or being active outdoors. Favorites include snowboarding and bicycling.

Michael can be reached at his office at the Brooks Center or via e-mail at htmisper@vt.edu.

Bio-based Materials Center Receives Grant

Recently the Bio-Based Materials Center (BBMC), dedicated to the promotion of world-class multidisciplinary research and education in the critical field of bio-based materials, received an important grant from the Virginia Tech Institute of Critical Technology and Applied Science. The grant, proposed jointly from the BBMC and the Nano-Bio Interface group, will permit the purchase of a state of the art size exclusion chromatography instrument, which will be dedicated to the analysis of bio-based polymers and will greatly further the mission of the BBMC and its students and faculty. The interdisciplinary BBMC includes 15 Virginia Tech faculty members working in the bio-based materials field, across five colleges and nine departments. WSFP participates strongly in the BBMC, with Professors Kevin Edgar (center director), Chip Frazier, Maren Roman, and Scott Renneckar being members.

Edgar Receives USDA NIFA Grant

Cellulose from trees and other plants is an important source of natural-based materials, such as cellulose ethers and esters, with commercial sales in the billions of kilograms for markets as diverse as adhesive tape, laundry detergents, latex paints, drug delivery, and hundreds of others. Even after nearly a hundred years of commercial use, we still have extremely limited ability to synthesize these cellulose derivatives with a high degree of control over where these ether and ester substituents are attached. This is an important problem because we know from the few instances where such control is possible that cellulose ethers and esters have very different properties depending on where the substituents are located. Last month the USDA awarded a grant of approximately \$0.8M to a team led by Professor Kevin Edgar to investigate novel synthetic methods that the team believes will permit synthesis of cellulose ethers and esters with a great degree of control over where the substituents are placed on cellulose. They believe that such methods will teach us how to make cellulose derivatives with superior properties, enhancing our ability to utilize these biomass-based polymers in high value applications.

Visit to Institute for Advanced Learning and Research at Danville (IALR), VA

On March 4, 2011 Department of Wood Science and Forest Products faculty Dr. Young T. Kim was invited to make a presentation at the Institute for Sustainable and Renewable Resources (the plant biology program) within the Institute for Advanced Learning and Research (IALR) in Danville. Kim toured several laboratories (Engineering labs, bioenergy and molecular biology labs, and analytical chemistry labs) at the Institute and had individual meetings with the Institute's faculty and VT graduate student groups to share information about recent technology in bioenergy production and its utilization for the packaging industry area. Dr. Kim's visit also continued the development of productive relations and collaboration between IARL and the VT's Department of Wood Science and Forest Products, and particularly the Department's growing packaging program (see image). There was intensive discussion regarding collaboration for new grant proposals and the sharing of facilities and technologies for research and education.

Dr. Kim's presentation focused on both "Characterization of biopolymer based films using advanced technologies" and "Sustainable packaging system development using biodegradable polymers" both of which are cutting edge areas in the field of packaging science. He introduced technology that involves a novel and simple non-destructive NMR technique capable of optimizing the ratio of packaging additives that are important for food and pharmaceutical packaging relative to gas/vapor barrier properties. The work presented was the first attempt to characterize the behavior of all protons in a packaging film matrix using low field ^1H NMR technology to permit correlation of molecular mobility with free volume in protein-based biopolymer films when plasticized with water and glycerol. Kim also reviewed an advanced, yet simple technology that will be useful for industry in determining the freshness and quality of food products in terms of the progress of lipid oxidation. This work represents cutting edge technology in the area of smart packaging systems, and it represents the first attempt to determine the antioxidant activity of biopolymer films using a pH indicator based on redox potential. It is expected that this new method could be used for determining the antioxidant capabilities of film-based packaging samples for food systems, and also be functionally embedded within food packaging systems as an indicator of the freshness or quality of food products and a patent is under preparation.

Kim also spoke about a new US patent-filed sustainable packaging material that is being developed using biodegradable polymers such as polylactic acid (PLA) – a naturally derived monomeric acid that can be polymerized for a variety of uses. The new PLA resin relies on advanced technologies such as the addition of cyclodextrin and well-exfoliated nanoclay materials into the polymer matrix to form a complex. It may be a good solution to resolve some of the major problems that biodegradable polymers in packaging systems are currently experiencing such as low thermal stability and poor gas barrier properties. After Dr. Kim's presentation, there was an intensive round table discussion exploring opportunities for collaboration opportunity between IALR and VT based on technologies each party could bring to the table. A copy of

the presentation can be obtained from Dr. Kim (01-540-231-1156; ytkim@vt.edu). The meeting concluded with a promise to further discussion and research collaboration in the near future.

Dr. Young T. Kim (left), Dr. Barry Flynn (middle), and Dr. Chuansheng Mei. Dr. Kim introduces his technology to IALR members (b and c). Twin screw extruder system in the IALR engineering lab (d).



Graduate Students Spring 2011 Symposium

Friday, April 29, 9:00 a.m. – 3:00 p.m., Fralin Auditorium

Please note that on April 29th, 2011, the Department will hold its' Spring Symposium, with graduate students and post-docs presenting updates on their research. As you can see below topics range from classic wood mechanics to wood supply issue, building construction, and forest products business. The public is welcome and encouraged to attend any part of the Symposium. Food will be provided.

For more information, download the symposium abstract, or RSVP to attend the symposium visit the [Graduate Student Symposium website](#)

Symposium Schedule

9:00 am – 9:10 am Opening Remarks

Session I

9:10 am – 9:40 am Profile of the U.S. wood pallet supply chain
[Scarlett Sanchez](#)

9:40 am – 10:10 am Assessing success factors to sustain continuous improvement. A multiple case study.
[Johanna Madrigal](#)

10:10 am – 10:30 am Coffee Break

Session II

10:30 am – 11:00 am Introduction to Lean Accounting
[Adrienn Andersch](#)

11:00 am – 11:30 am Designing a Fall Arrest System for Residential Construction Workers
[Lori Koch](#)

11:30 am – 12:00 pm Fracture Cleavage Testing in Adhesively-bonded Wood
[Xing Yang](#)

12:00 am – 12:30 pm Applying Lean Thinking to the Furniture Engineering Process
[Chao Wang](#)

12:30 pm – 1:30 pm Lunch Break

Session III

1:30 pm – 2:00 pm Quantitative Analysis of Compressive Stress Distributions across Pallet Surfaces
[Jiyoun Yoo](#)

2:00 pm – 2:30 pm Correlation of the elastic properties of stretch wrap and wrap pattern on containment force when applied to a unit load
[James Bisha](#)

2:30 pm – 3:00 pm Investigations on the degradation of wood particles in extrusion process and x-ray scanning of the particle orientation in Wood Polymer Composites
[Timo Grüneberg](#)

UPCOMING Open House and Workshops



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*Take a Tour
3-5 pm Tuesday
March 29, 2011*

See what the WEI does:

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- Product offerings
- Processes and tools
- Business solutions
- Live demonstrations
- Refreshments
- Prizes and more...



Why Lean Administration?

**2-day Workshop on Lean Administration
March 29-30, 2011**

\$600 \$300 per person
(Lunch and coffee breaks included)
Free for Lean Club Members

Holiday Inn RDU
930 Airport Boulevard
Morrisville, NC 27560
Room reservation code: VTL

Contact Information

Web: www.vtlean.org/club/workshops/
E-mail: info@vtlean.org
Phone: (540) 443 6688



Day 1 – 9:00 am – 6:30 pm

- Welcome and introduction
- Expert speaker
- What keeps you awake at night?
- Simulation and value-stream mapping – current state
- Lean principles in administration
- Reception

Day 2 – 9:00 am – 4:00 pm

- Lean methods
- Simulation and value-stream mapping – future state
- Role of leadership
- What keeps you awake at night? – problem solving
- Lean transformation example

Outcome

- Understanding of lean administration
- Ideas how to improve your administrative processes
- Access to lean community

CALL FOR ABSTRACTS

ISCHP³11 will bring industry professionals, scientists, association representatives, government employees, suppliers, and customers together to share knowledge, ideas, and to network. The conference will cover hardwood related issues from the source to the customer, discuss recent developments, and show paths into the future. ISCHP³11 will have a special focus on sustainability and certification and help to further promote the important role of the world's leading renewable, carbon-absorbing raw material.

We are inviting presentations, papers (peer and non-peer reviewed), posters, and commercial exhibits for this International Hardwood Conference in the following areas:

- Forestry practices and hardwood quality
- Supply chain management
- Hardwood processing and optimization
- Markets, trade, and business insights
- Certification and sustainability
- Hardwood innovations of the future

Abstracts submission deadlines

- Mar. 31, 2011 Peer-reviewed paper and presentation abstracts submission deadline
(submit to: ischp2011.review@gmail.com)
- June 30, 2011 Non-peer reviewed paper and presentation abstract submission deadline
(submit to: ischp2011.noreview@gmail.com)
- Aug. 16, 2011 Presentation (without a paper) abstract submission deadline
(submit to: ischp2011.nopaper@gmail.com)
- Aug. 16, 2011 Poster abstract submission deadline (submit to ischp2011.poster@gmail.com)

For all abstract submissions, please put "ISCHP2011-author's last name" in the subject of your email, and include the following required information in the **body** of the email (no attachments accepted):

- 1) Type of submission (peer-reviewed paper and presentation, non-peer reviewed paper and presentation, presentation, or poster)
- 2) Title of submission
- 3) Author(s) and their affiliation(s)
- 4) Corresponding author's mailing address, telephone number, and email address, and
- 5) Abstract (**250 words or less**).

Other important dates

- Sep. 16, 2011 Registration deadline for at least one author per contribution to have paper included in proceedings or presentation and poster accepted
- Oct. 14, 2011 Final presentation (.ppt or .pptx) uploaded to web (See website for updates)

Publication

Two proceedings (one for peer-reviewed contributions and one for non-peer-reviewed contributions as well as presentation and poster abstracts) will be published as electronic files (pdf) with ISBN numbers and handed out at the conference. Upon special request and for an additional fee (\$75), printed copies of the proceedings will be made available.

Contact

Urs Buehlmann
Virginia Tech
Department of Wood Science and Forest Products
Phone: 540-231-9759
Email: ischp2011@gmail.com