The Department of SUSTAINABLE BIOMATERIALS
Volume 7 — July/August 2012

The newsletter for the Virginia Tech, Department of Sustainable Biomaterials, Formerly the Department of Wood Science and Forest Products

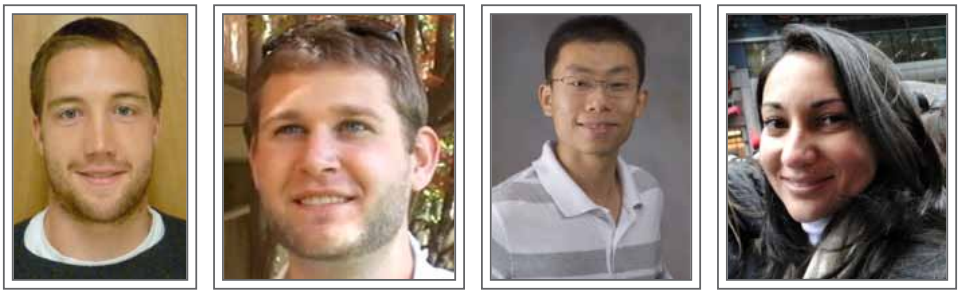
Sustainable Biomaterials Newsletter

Greetings from Virginia Tech,

The students are HERE!! And the campus is gearing back up to full throttle after a busy summer of research, meetings, summer classes, and a bit of vacation too. Classes do not start until next week, but the campus is a hive of activity with students and their parents unloading U-Hauls of gear into dorms. You just have to wonder how they fit it all in one dorm room! (It seems like things were simpler in the old days ;-)

Our student enrollments in the Sustainable Biomaterials department continue to grow with 71 students even before we start the semester. Residential Wood Construction is still one of our most popular Options, but all of the Options are growing and we know that this trend will continue. Packaging Science is still small, but there has been lots of interest from new students. All of the faculty and our students have been doing a tremendous job in "marketing" the new department name and our options, and there are many positive things happening for our students.

One of the most exciting Professional activities this summer for our students was the Forest Products Society meetings in Washington, DC. It was great to see the "Wood Science Bowl" competition this year with "Team Quercus" from Virginia Tech taking first place using their extensive knowledge of wood science and a little creative strategy as well. Congratulations to Shawn Crawford, Jeff Dolan, Qingqing Li and Johanna Madrigal. Their teamwork and the fact that they each had a different sub-specialty in the field of sustainable biomaterials and wood science was the key to their success. They did an outstanding job against some very stiff competition from Oregon State and several other great schools.



From left to right: FPS Wood Science Bowl winners from Virginia Tech's "Team Quercus". Shawn Crawford, Jeff Dolan, Qingqing Li, and Johanna Madrigal.

There's lots of other good information inside the newsletter, so please take a look.

As always, we want to hear from you, our alumni and friends. Let us know how you are doing and if you have news events that we should know about or just want to say Hello, please jot us an email or a letter. We value your support and look forward to input on how we can make the department serve students and the public in even better ways.

Sincerely,

Barry Goodell
Head, Department of Sustainable Biomaterials
Goodell@vt.edu

STUDENT FACES IN THE DEPARTMENT

Meet Jason Hoepker

Jason is a sophomore in the department and he is focusing on the Packaging Science Option. Jason comes to us as a transfer from the College of Life Sciences and Agriculture but when he heard about the Packaging program in the Department of Sustainable Biomaterials, he decided it was time to switch. Not only is he taking classes toward his degree, but Jason worked as a summer intern in our Center for Packaging and Unit Load Design this summer. He has also been active in helping the department promote our undergraduate program to help recruit new students.

In his spare time, Jason enjoys hiking, climbing and cycling.

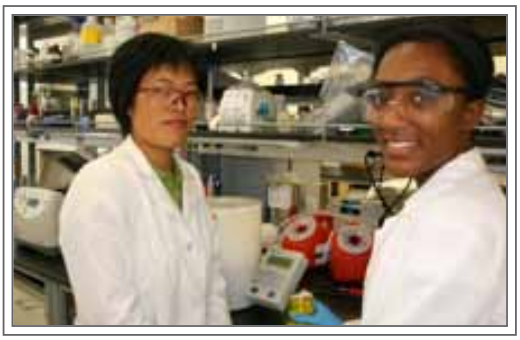
About his experience in the Sustainable Biomaterials Department, Jason says: "My experience in the department has been great. I really was able to get involved in my major quickly. The professors sought me out and got me involved when I came into the Department. I think that is pretty rare in a huge university like Virginia Tech. I have been able to meet and build relationships with my professors even before taking a major class through an internship I got this past summer at the Center for Packaging and Unit Load Design. Getting an internship after your freshman year is unheard of but, this department enables students to get experience early in school which will make it easier for students to get more summer internships and employment after graduation."

Jason Hoepker, undergraduate in the department's Packaging Science Option helping out in a recruitment event this past summer near Squires Student Center on the Virginia Tech campus.

Spotlight on Undergraduate Research

This summer, the department hosted again several undergraduate researchers in its labs. Associate Professor Maren Roman supervised two projects under the NSF-funded Summer Undergraduate Research Program of the Macromolecules and Interfaces Institute. Omkar Betageri, a rising junior and biomedical engineering major at the University of Connecticut, studied the bioactivity and cytotoxicity of surface-oxidized cellulose nanocrystals for applications in bioresorbable bone scaffolds. Frances Ampah, a rising senior and pre-med psychology major at Virginia Tech, investigated a new method of cellulose nanocrystal functionalization for drug targeting of cancer cells. Both students worked closely with their graduate mentors, Jung Ki Hong and Shuping Dong, respectively. Omkar gloriously concluded the summer research program by winning the "Best Scientific Lecture" award. Congratulations, Omkar!

Omkar Betageri testing the effect of cellulose nanocrystals on the pH of cell culture medium



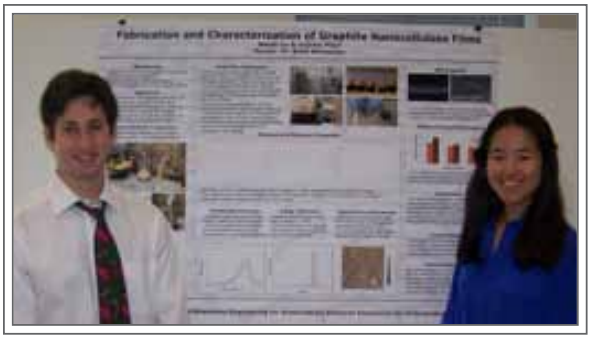
Frances Ampah (right) with her graduate mentor Shuping Dong.

Professor Kevin Edgar supervised three projects under the SURP program. Earl Ritchie, a rising senior chemistry major from Clemson University, worked with graduate mentor Haoyu Liu to synthesize novel cellulose derivatives that have proved to be superior drug delivery polymers. Michelle Mahoney, a rising senior biochemistry major at VT, worked with mentor Junia Pereira to synthesize new derivatives of the polysaccharide pullulan, developing novel synthetic routes and making some very promising new pullulan derivatives. Josh Moore, a rising senior biology major at St. Paul's, worked with mentor Sidd Pawar to synthesize a series of novel polysaccharides for a joint project with the Wake Forest Institute of Regenerative Medicine on diabetes treatment.

Michelle Mahoney

Josh Moore

Part of the NSF sponsored Bioprocess Engineering program, Mandy Liu (Chemical Engineering rising sophomore, Pennsylvania University) and Andrew Seiden-Plaut (Chemical Engineering, rising junior, Cornel University) participated in research on strong electroactive nanocomposite films of graphite and nanocellulose. The students worked for 12 weeks with Dr. Renneckar's research group; during their time they synthesized nanocellulose and used state-of-the-art analytical equipment to characterize and measure the properties of these films. The films were stronger than many other polymeric materials, while displaying enhanced conductivity. These materials have great potential as electrodes in Lithium ion batteries or even as conductive textiles.



Andrew and Mandi present their research results at the conclusion of the Bioprocessing Engineering REU program.

Professor Chip Frazier sponsored three NSF undergraduate projects. Also as part of the NSF sponsored Bioprocess Engineering program, Kirsten Parratt (rising senior Chemical & Biological Engineering, Princeton University) and Nicole WongK (rising sophomore Chemical Engineering, University of Southern California) worked as a team to develop novel rheological methods to analyze switchgrass for renewable energy applications.

Christa Weaver (rising sophomore Sustainable Biomaterials, VT) was sponsored by the NSF and the Wood-Based Composites

Kirsten Parratt (left) and Nicole WongK

Christa Weaver

Center to develop new methods to analyze natural formaldehyde emissions from lignocellulosic biomass, like wood and grasses.

The members of Center for Packaging and Unit Load Design have been sponsoring two projects under a new summer research internship program. Zack Shiner (rising junior), Rosemary Masser (rising Senior), and Jason Hoepker (rising sophomore) from the Department of Sustainable Biomaterials at Virginia Tech were working with Dr. Laszlo Horvath to investigate the effect of air circulation in shipping trailers on mold growth using green hardwood pallets. The outcome of the research could generate a commercially available solution to prevent mold growth during transportation and storage of green hardwood pallets.

Jason Hoepker (left), Rosemary Masser (center), and Zack Shiner (right) during the final grading process

Learn More About the Department of Sustainable Biomaterials

In the CNRE Summer 2012 News Magazine.

The Cover Story in the Colleges' latest issue of the CNRE News Magazine features the Department of Sustainable Biomaterials. Learn more about Professor Kevin Edgar's work on polysaccharide delivery of anti-cancer drugs, Associate Professor Maren Roman's work on nanoscale materials used in producing bone repair scaffolds, Assitant Professor of Practice Young Teck Kim's work on food and pharmaceutical packaging systems, Professor Earl Kline's work with the Wood Enterprise Institute, and Scott Renneckar's work on converting biobased feedstocks to materials and composites. The department maintains its roots in wood science and forest products, and still produces the best graduates in the country in the field. But even as we deepen those roots, we have expanded into new areas over the past decade, to lead the way for new industries in the continually evolving field of sustainable biomateirals. See the entire newsmagazine on the web. And please let us know if you would like a printed copy!

Logo Stickers Are Here — Get 'em While They Last!

We just had a batch of adhesive-backed stickers printed up to celebrate the new department name. These are suitable for your car window, bicycles, doors, notebooks, or where ever else you might think of. If you would like one, just jot us a note or a quick email to Debbie Garnand garnandd@vt.edu or Angie Riegel Riegel ariegel@vt.edu and we will mail it right out.

The Department of SUSTAINABLE BIOMATERIALS at Virginia Tech

www.sbio.vt.edu

Spread the word about the department and show your support by sporting a sticker!

Unit Load Design Short Course Becomes an International Event

By Laszlo Horvath,

The Center for Packaging and Unit Load Design conducted its bi-annual unit load design short course May 15-17, 2012 with great success. More than 20 participants from three continents arrived Blacksburg to learn about the principles of systems based unit load design. The participants included purchasing agents, sales people, pallet designers, and consultants showing that knowledge of unit loads is important for many different areas. Mark White (Professor Emeritus) was invited by Laszlo Horvath (Director) to share his extensive experience in the field of pallet and unit load design. During the two and a half day event, the participants got hands on experience in unit load design using Best Load® which is a newly created unit load design software and learned about a new systems based unit load design methodology where the interaction between different parts of the unit load are used to make the unit load more sustainable. The unit load design short course will be held again September 25-27, 2012. For more information please visit http://unitload.vt.edu/ or call (540) 231-7673.

Mark White (Instructor) presenting ways to reduce the amount of corrugated in the unit load by designing the pallet differently.

Hammett and Quesada Participated in Global Forest Products Conference in Portugal

Faculty members Tom Hammett and Henry Quesada from the Department of Sustainable Biomaterials at Virginia Tech participated as speakers and session chairs in IUFRO All Division 5.0 (Forest products) held in Estoril, Portugal during July. The five-day conference's goal was to serve as a global forum to discuss the major issues affecting forest and forest products. As over 500 scientists from 62 countries attended to present their research it was good to have representatives from Virginia tech in attendance.

Dr. Quesada's led a technical session, Buying into Sustainability, that was crafted to reflect on how current research and industry developments are incorporating sustainability into product, manufacturing, and business processes. Five

speakers presented selected research developments on life cycle analysis, efficient sawmilling and kiln drying techniques, strategic sustainability, and safety issues for wood products industries.

Dr. Hammett organized and moderated two separate technical sessions — each focused on different aspects of current research in non-wood forest products (NWFPs). He also presented two invited papers — one on Appalachian NWFPs and the other on his green business class co-authored with Dan Hindman. As the Coordinator of the NWFPs Research Group (IUFRO 5.11) he organized and led a business meeting for other researchers at the Conference. He also presented report to the IUFRO Division 5 coordinators on the status of the NWFP Research Group.

Drs. Hammett and Quesada enjoy a break with Drs. Gazo and Haviarova from Purdue University during the IUFRO Division 5.0 Conference in Estoril, Portugal

For both Hammett and Quesada this conference was a valuable setting to present and discuss status of their forest products research to collaborators and colleagues in Europe, Asia, and Latin America.

Besides many technical and product centered technical areas the IUFRO All Division Five Conference also convened a session on innovative teaching techniques. Tom Hammett presented a paper co-authored with Dan Hindman that combines student project teams from their green business and green building classes. The presenters for the IUFRO Forest Products Education Technical Session pose after their session.

Tom Hammett (back left) leads a business meeting for the IUFRO Non-wood Forest products Research Group in Estoril, Portugal.

Energy Savings Through Lean Thinking

September 27, 2012 from 9:00 a.m. to 4:30 p.m.
Virginia Tech Roanoke Center. Roanoke, VA.

Agenda

- Energy update
- Best practices for energy savings
- Energy savings through lean thinking
- Case study 1: Specific industry update
- Energy Management Systems
- Case study 2: Saving energy consumption through Kaizen events
- Adjourn

Registration fee: $50. Includes coffee break and boxed lunch.

For details contact For details contact Henry Quesada at quesada@vt.edu or (540) 231-0978

Unit Load Design

"How to reduce shipping costs"

September 25-27, 2012
Thomas M. Brooks Forest Products Center, (1650 Tech Center Drive, Blacksburg, VA 24061 (map)

Who should attend: Packaging, pallet, and material handling equipment suppliers, as well as the users of these components.

Objectives:

- Lower Unitization Costs
- Reduce product damage
- Identify opportunities in warehouse audits
- Increase material handling rates
- Understand the perspective of packaging engineers, pallet suppliers, and equipment designers.
- Learn Unit Load Design: the systems based optimization procedures that will improve customer service and increase your competitiveness

Topics include: Principles of unit load design; Unit load material handling audit; Packaging design; Pallet design; Material handling systems; Interactions between material handling equipment, packaging, and pallets; Diagnosing and solving material handling problems; stringer class pallet design using Best Load®; Laboratory Tour.

Instructor: Marshall S. White (Professor Emeritus and CEO of White and Company)

Cost:

- $450 members of Center for Unit Load Design
- $800 members of ISTA/MHIA/Pallet Profile Subscribers
- $900 Non-members

Registration fee includes all course materials, CEU certificate, daily continental breakfasts and refreshment breaks.

Registration Deadline: September 5, 2012 (Late registration +$50)

For information on the Unit Load Design short course:

Registration: Virginia Tech Outreach Program Development at (540) 231-5182

Lodging: Angela Riegel at (540) 231-7107

or visit our website http://unitload.vt.edu/

Quantitative Methods for Management

October 18-19, 2012 from 8:30 a.m. to 5:00 p.m.
Virginia Tech Roanoke Center. Roanoke, VA.

Agenda

- Basics of decision making
- Spreadsheet basics
- Basic statistical concepts
- Data generation using Montecarlo methods
- Forecasting
- Inventory control models
- Design of experiments
- Linear programming
- Queue Analysis
- Markov Analysis
- Simulation

Registration fee is $400. Includes all coffee breaks, lunches, materials, and certificate.

For details contact For details contact Henry Quesada at quesada@vt.edu or (540) 231-0978

Wood Pallet Design and Performance

"Pallet Design in the 21st Century"

November 7-8, 2012
Thomas M. Brooks Forest Products Center
1650 Research Center Drive, Blacksburg, VA 24061

Who should attend: wood pallet suppliers and sales professionals, professionals responsible for pallet purchases, packaging engineers and pallet specifiers

Objectives:

- Learn how pallet design and selection affects materials handling costs
- Learn the fundamentals of stringer class pallet design and performance including both new and remanufactured wood pallets
- Learn the fundamentals of block class pallet design and performance
- Learn how to use Best Load® to design stringer class pallets

Topics include: effect of pallet design and selection on materials handling costs; fundamentals of new and remanufactured stringer class pallet design; designing block class pallets; designing stringer class pallets using Best Load®

Instructor: Marshall S. White (Professor Emeritus and CEO of White and Company)

Cost:

- $450 members of Center for Unit Load Design
- $800 members of ISTA/MHIA/Pallet Profile Subscribers
- $900 Non-members

Registration fee includes all course materials, CEU certificate, daily continental breakfasts and refreshment breaks.

Registration Deadline: October 10, 2012 (Late registration +$50)

For information on

Registration: Virginia Tech Outreach Program Development at (540) 231-5182

Lodging: Angela Riegel at (540) 231-7107

or visit our website http://unitload.vt.edu/

Third Innovation-based Manufacturing Workshop

November 15, 2012 from 8:00 a.m. to 3:00 p.m.
The Inn at Virginia Tech. Blacksburg, VA

Agenda

- Innovation update in the manufacturing sector
- The manufacturing report
- Case study 1
- Key note speaker. TBA
- Entrepreneurship and Innovation
- Case study 2
- Role of Innovation in Economic Development
- Student innovation-based manufacturing competition

Registration fee is $50. Includes coffee break and boxed-lunch.

For details contact For details contact Henry Quesada at quesada@vt.edu or (540) 231-0978