

Fiber & Biopolymer Research Institute

Newsletter April-September 2019

39th Session of the Texas International Cotton School

The 39th session of the Texas International Cotton School was held August 5th-15th, 2019. The Lubbock Cotton Exchange in coordination with the Fiber & Biopolymer Research Institute hosted 11 professionals from across different areas of the cotton industry. These students were immersed into the many aspects of cotton from the farm to the textile mill and everything in between. This was an intensive two-week educational course on cotton and textiles that provided experience, knowledge, and insight into future developments affecting global markets.

Speakers from the different cotton industries volunteered their time to bring subjects to this class. Some of the classes that were taught were: History of the Cotton Industry & Systems, Conversion of Yarn to Fabric, Cotton Sustainability, Cotton Insurance, Trade Finance and so many more. The students also went on tours at: The Heinrich Brothers Farm, the FBRI, BASF, Lubbock Cotton Growers Gin & Farmers Coop Compress to name a few. During these two-weeks, the students are given many opportunities





TEXAS TECH UNIVERSITY

Fiber & Biopolymer Research Institute

39th Texas International Cotton School Students: Front Row: Arnella Trent, Yessica Cavasos, Courtney Knowles, Julie Mendoza, Elizabeth Van Hersh, Joni Blount. Back Row: Chris Looney, Alberto Sada, Jay Ji, Matthew Moose, Andrew Sprague.

US Patent granted to FBRI

US Patent No.: US 10,311,993 B2 "*Cotton fiber dissolution and regeneration and 3D printing of cellulose based conductive composites*" was granted to Noureddine Abidi and Yang Hu on June 4, 2019. The invention relates to the isolation of cellulose nanocrystals based on their size, dissolution, and transformation to films, and conductive materials.



Films made from cotton cellulose.

TWO International Applications were published

- WO 2019/143802 A: Dissolution of Cellulose in Ionic Liquids
- WO/2019/094946: System and Method for Fibrogram Quality Evaluation

Special points of interest:

- 39th Annual Texas International Cotton School
- Complete humidification system installed on Lummus microgin.

Helpful Links:

<u>FBRI</u>

Plant and Soil Science

CASNR

<u>TTU</u>

Biopolymer Research Group



V. Mendu

FBRI Recognized

Dr. Mendu Receives International Impact Award

Congratulations to Dr. Venugopal Mendu! He received the International Impact Award presented by the College of Agricultural Sciences and Natural Resources. Dr. Mendu along with 8 other faculty was recognized as part of the Outstanding Faculty & Staff at the annual CASNR Awards Ceremony. There ceremony was held at the Department of Animal and Food Sciences livestock arena on August 22, 2019. Full story <u>here</u>.

FBRI participates in the National Science Foundation National I-Corps program

National Science Foundation Innovation Corps (I-Corps) program prepares scientists and engineers to extend their focus beyond the university laboratory and accelerates economic and societal benefits of NSF-funded, basic-research projects that are ready to move toward commercialization. The FBRI is proud to announce that we had a team selected to compete in the National I-Corps competition after completing the Texas Tech University regional I-Corps requirements. This team, comprised of Dr. Brendan Kelly (Faculty), Wylie Bomar (Mentor), Abu Sayeed & Zach Hinds (Graduate Students) has spent the summer working on customer discovery and presentation. As a team, they participated in a seven-week curriculum where they learned what it take to achieve a commercial impact with their innovation. For more information on the I-Corps program <u>click here</u>.

FBRI Attends CABLE

Student Delegate, Sayeed and Faculty Mentor, Dr. Brendan Kelly attended the first meeting of Cohort 3 of the Consortium for Advanced BioEconomy Leadership Education, CABLE. This program trains students to pursue leadership positions in bioeconomy-related careers. The program is lead by Ohio State University with funding from the U.S. Department of Agriculture, National Institute of Food and Agriculture. Dr. Kelly and Abu Sayeed (graduate student) represented FBRI and Texas Tech University in Des Moines, IA in July 2019. They were among over the over 50 participating members at the conference. They came away with the task of working with peers to assess and make recommendations for key bioeconomy-related issues. For more information about the program <u>click here</u>.



From the lest to the right: K. Brendan, Abu Sayed, and Zach Hinds.



Abu Sayed, FBRI graduate student, pictured on the left.



Mario Pedroza

Tony Rascon

FBRI Team Expands

The FBRI was pleased to welcome two new employees this summer. Mario Pedroza was hired to run the FBRI microgin. He has been fully trained and has already ginned more than 400 samples this harvest season, mostly from south Texas. The FBRI microgin laboratory gins on average 4,000 samples per year for researchers, seed companies, and breeders.

Tony Rascon was hired to run High Volume Instruments and to help in the gin when needed. Tony comes with experience from the USDA.

FBRI continues its tradition of hosting tours and demonstration

Several individuals and groups visited FBRI:

- Argentina Delegation Tour hosted by John Deer (30 visitors)
- Brazilian Farmers from COOAMI, a cotton Coop in Mato Grosso, Brazil (19 visitors). The group included agronomists, ginners, cotton quality, consultants, and marketing.
- Brazilian Farmers hosted by BASF (18 visitors)
- Indigo Ag
- Greg Ibach, USDA Deputy Undersecretary and Darry Ernest, Deputy Administrator USA AMS Cotton & Tobacco Program.
- Arun Agarwal, Chief Executive Officer of Nextt amd Ms. Cami Jo Vandiver, Executive Sales Manger of Nextt.



From left to right: E. Hequet, G. Ibach, and D. Ernest



Hequet explain the ring spinning process



Visitors from Brazil



Visitors from Argentina

FBRI Publications: April—September 2019

Peer Review Papers:

- 1. A. Bouyanfif*, S. Liyanage[¥], E. Hequet, N. Moustaid-Moussa, N. Abidi. Fourier Transform microspectroscopy detects biochemical changes during *C. elegans* lifespan. *Vibrational Spectroscopy*, 102(2019)71-78.
- 2. Md-J. Uddin*; N. Abidi, J. Warzywoda, H. Gill. Investigation of the fate of proteins and hydrophilicity/hydrophobicity of Lycopodium clavatum spores after organic solvent-base-acid treatment. *A CS A pplied Materials & Interfaces*, 11(2019) 20628-20641.
- 3. N. Dissanayake*, V.D. Thalangamaarachchige[¥], M. Thakurathi, M. Knight, E. Quitevis, N. Abidi. A physicochemical approach to understanding the dissolution of cotton cellulose in mixtures of 1-Butyl-3Methylimidazolium Methylphosphonate and 1-Alkylimidazole co-solvents. *Carbohydrate Polymers*, 221(2019)63-72.
- 4. R.S. Dassanayake, P.W. Wansapura, P. Tran, A. Hamood, N. Abidi. Cotton cellulose-CdTe quantum dots composite films with inhibition of biofilm-forming *S. aureus. Fibers*, **2019**, *7*(6), 57; <u>https://doi.org/10.3390/fib7060057</u>.
- 5. L. Cabrales, N. Abidi. Kinetics of Cellulose Deposition in Developing Cotton Fibers studied by Thermogravimetric Analysis. *Fibers*, 2019, 7(9) 78 doi:10.3390/fib7090078.
- 6. Thu, S.W.[#], Rai, K.M.^Ψ, Sandhu, D^{*}, Rajangam, A., Balasubramanian, V.K.[#], Palmer, R. G., and Mendu, V.^{*} (2019) *Mutation in a PHD-Finger Protein MS4 causes male sterility in soybean. BMC Plant biology*, 19:378, <u>https://doi.org/10.1186/s12870-019-1979-4</u>.
- Yuan, N.^Ψ, Balasubramanian, V.K.[#], and Mendu, V.* (2019) The photoperiodic flowering time regulator FKF1 negatively regulates cellulose biosynthesis. Plant Physiology, Vol. 180, pp. 2240-2253, DOI: <u>https://doi.org/10.1104/pp.19.00013</u>.
- Pandey, M. K., Kumar, R., Pandey, A. K., Soni, P., Gangurde, S. S., Sudini, H. K., Fountain, J., Chen, X., Jiang, H., Mendu, V., Guo, B., Liao, B., Zhuang, W., Wang, X., Liang, X., Varshney R. K.⁹, (2019) *Mitigating aflatoxin contamination in groundnut through combining genetic resistance and post-harvest management practices. Toxins*, 2019, 11, 315; doi:10.3390/toxins11060315.

Book chapter:

1. S. Acharya, P. Prakash, R. Shaida. Cellulose Nanocrystals – Sources, Preparation, and Applications: Research Advances. *In:* Cellulose nanocrystals: Advances in Research and Applications. Nova Publisher, *IN PRESS*

Installation of a complete humidification system for our Lummus microgin

The Fiber and Biopolymer Research Institute entered into a research agreement with Samuel Jackson Incorporated (SJI) of Lubbock. As part of the agreement is the installation of a complete humidification system for our Lummus microgin. The humidification system consists of a gasfired moist air generator with electrical controls, moisture sensors for cotton fiber, a touchscreen system control unit called a Moisture Mirror, a generic gas-fired air heating unit for drying tests, and a generic manual feeding system with rotary airlock to facilitate the drying process in the microgin environment. The equipment installation is complete, and the system is now fully operational. It will allow us, among other projects, to initiate a new research program on the effect of the seedcotton moisture content on the preservation of cotton fiber quality during ginning and lint cleaning. The value of the installed products and materials is \$197,000. We are grateful for this SJI's donation and we look forward to working with them.





SJI's humidification system connected to FBRI microgin.

FBRI Acquires new AFIS PRO

FBRI purchased a new Advanced Fiber Information System (AFIS PRO2) from Uster for the Cotton Phenomics Lab. This instrument will be installed by mid October 2019.

FBRI Laboratories

Provide valuable research and evaluation services to cotton breeders, researchers, producers, and seed companies. They also provide excellent opportunities for undergraduate and graduate students to perform their research projects on cotton.

Ginning (contact: noureddine.abidi@ttu.edu)

- Micro-gin: 24-saw fully-equipped Lummus Imperial III gin stand fed by a Lummus 700 Feeder. The gin is equipped with a super-jet lint cleaner behind the gin stand and a single Sentinel II saw lint cleaner (18" in width) for lint cleaning.
- Tabletop 10-saw gin (minimum 50 g)
- Tabletop roller gin (for small sample 10 g or less)

Fiber Testing (contact: khawar.arain@ttu.edu)

- High Volume Instrument (HVI): HVI testing using Uster Technologies 1000 systems, providing the average of micronaire, length, uniformity, strength, elongation, color, and trash
- Advanced Fiber Information System (AFIS): AFIS provides measurements for length, maturity ratio, fineness, neps, and trash
- FAVIMAT single fiber testing to determine tenacity, elongation, work-to-break, and linear density
- Yarn testing

Yarn Spinning (contact: khawar.arain@ttu.edu)

- Yarn spinning (carded and combed)
- Rotor spinning

Other testing (contact: noureddine.abidi@ttu.edu)

- Fiber cross-section
- X-Ray diffraction, FTIR analysis, Thermogravimetric analysis, High Performance Liquid Chromatography
- Color reading, small sample dyeing

Visit us on the web! http://www.depts.ttu.edu/pss/FBRLphp

Managing Director: Noureddine Abidi, PhD.

Shipping: 1001 East Loop 289 Frontage, Lubbock, TX, 79403

Mailing: PO Box 45019, Lubbock, TX, 79409 Lubbock, TX 79403