

## Cellulose Nanofibre Workshop - 15th July 2016

### BioPRIA, Monash University WORKSHOP REPORT

BioPRIA has held the 2nd Cellulose Nanofibre Workshop in collaboration with Appita. The aim of this workshop is to provide an overview of the applications for cellulose nanofibres, the world-wide market and future outlook and more significantly, the current capabilities within Australia in the production of this emerging material and its applications.

There were approximately 30 attendees from industry and academia. Welcome addresses were given by Professor Gil Garnier (Director of the Bioresource Processing Research Institute of Australia - BioPRIA) and Dr. Warren Batchelor (Deputy Director of BioPRIA and leader of the Materials Platform of the Bioresource Advanced Manufacturing Initiative - BAMI Industry Transformation Research Hub).

The sessions were filled with interesting presentations. Dr. Warren Batchelor presented worldwide research production and trends. This was followed by characterisation of cellulose nanofibre dimensions in suspension and its effect on the flocculation mechanisms and drainage time presented by Ms. Praveena Raj from BAMI, Monash University. Professor Darren Martin from University of Queensland, also shared business development and commercial opportunities with Spinifex-derived nanocellulose technology. Demonstrations were given of cellulose nanofibre production and sheet manufacture. A product showcase like nanofibre aerogels for oil-water separation, latex-nanofibre composites, tempo oxidised nanofibre gels and barrier layers were also shown.

For the afternoon session, Associate Professor Takuya Tsuzuki from Australian National University delivered a presentation on the applications of cellulose nanofibres in recyclable thermoplastic nanocomposites. More diverse presentations were also given by Monash University's researchers on the application of nanocellulose. This included the possibilities of spraying nanocellulose in the base sheet for packaging applications and cellulose nanofibre hydrogels.

Read the full article here <<http://www.biopria.com.au/index.php/home>>

## BAMI Fortnightly Student Chapter Presentations

**Friday 29 July 2016 - 12:30 PM - 1:30 PM**

**Presenter:** Zhiyong He, PhD Student, BioPRIA/  
Department of Chemical Engineering

**Moderator:** Llyza Mendoza, PhD Student, BioPRIA/  
Department of Chemical Engineering

**Title:** Oil/water separation using cellulose hydrogel

**Friday 12 August 2016 - 12:30 PM - 1:30 PM**

**Presenter:** Mahmud Kibria, PhD Student, BioPRIA/  
Department of Chemical Engineering

**Moderator:** Pramod Sripada

**Title:** Single Particle Direct Gasification Model: theory and Experiment

**Friday 26 August 2016 - BAMI Review Meeting**

**Presentations:** Lionel Longe, Llyza Mendonza, Uthpala Garusinghe, Zhiyong He, Sankar Bhattacharya, Swambabu Varanasi, Kirubanandan Shanmugam, Anurag Parihar

## BioPRIA Social Activites

**Games Night—August 3, 2016**



The students and staff of BioPRIA and BAMI took some time away from lab work and enjoyed a cheerful games night on Wednesday, 3rd of August 2016 which was organised by student Mr Thilina Gunawardhana. A number of board games, computer games and other activities were played with everyone enjoying a relaxed evening followed by pizza and drinks. BioPRIA and BAMI hope to continue this at least once a month to give both the students and the staff an opportunity to destress and strengthen the harmony within the group.



**OCT/NOV: The Monash 10,000 Steps Challenge 2016:**

Two teams of five participants have been registered for 2016 Monash 10,000 Steps Challenge "Around the world in 75 days" commencing September 8, 2016.

## STAFF PROFILE

### Mr. Jinhua Dai

I received my Bachelor's degree from Central South University in China. Following this, in August 2014, I joined Monash University to start a PhD in Bioprocessing Advanced Manufacturing Initiative, working on Project 10(a): Catalytic deconstruction of lignin and characterisation.



My PhD research was focused on production of fine chemicals from lignin degradation by using chemical methods with mild conditions. I have investigated to use copper with N-based ligands as catalyst to depolymerise lignin from  $M_n=12,000$  to  $M_n=2,000$  in ionic liquid with mild condition. This part of work has been published in New Journal of Chemistry as "Effect of the N-based ligands in copper complexes for depolymerisation of lignin". The second part of study I am doing now is about oxidized lignin depolymerisation in ionic liquid. This part of work aims to oxidize the typical  $\beta-4$  bonds and then depolymerise the product with formic ionic liquid as both solvent and catalyst. The final goal is to combine these two methods together to further depolymerise lignin to produce fine chemicals with high value.

As a member of BAMI, I really enjoy working here communicating with people from either academy or industry. Firstly, I got a lot of good suggestions from other members in BioPRIA about my research, which can lead my research to a new direction and make me understand my research in various ways. Secondly, by listening to different presentations about biomass, I have learnt more about how are other researches about biomass going. Thirdly, after coming into contact with industrial characters, I had a better understanding of the paper and pulp industry and know more about what they want as a company. I feel lucky to work in BAMI with so many adorable and talented researchers.

As for my spare time, I love running and doing workout in gym. I would like to go trail running after work to relax myself, in which I can have more active mind for my research. With workout in gym, I have a better physiological strength to solve the problems I met through my research.

## New Equipment

One of the most recent additions to the BioPRIA labs is the Helix 24 Laser Cutter from Epilog. A key piece of equipment for the Haemokinesis project, the new laser cutter has allowed for rapid design optimization and development of the blood distribution system for the GLIF (Group Legible Immunohaematology Format) prototype.

With a tray table of 610mm x 457mm, the machine consists of a CO2 laser with the capabilities of cutting and engraving fine details (<0.2mm) into the desired materials. While fully capable for use with larger materials such as wood, acrylic, plastics and stone, an advantage of the Helix 24 is its ability to cut much thinner materials such as paper and plastic film with precision and accuracy. The easy design software acts much like a printer, giving BioPRIA the ability to cut almost anything with just a click of a button.



## BioPRIA/BAMI Conferences—Upcoming

**August :** Dr Warren Batchelor attended *Progress in Paper Physics Seminar* - Technische Universitat Darmstadt, Germany August 22 to 26, 2016.

**September :** Humboldt University of Berlin, Berlin, Germany 16-30 Sept, 2016

Dr Vikram Singh and student Ms Uthpala Garusinghe are invited guests. The main objective of this visit is to perform collaborative work with the Humboldt University (HU) of Berlin on engineering TiO<sub>2</sub> nanoparticles in cellulose matrix for photocatalytic activity and to come up with a membrane that works effectively in purifying or decomposing organic matter. Moreover, disperse TiO<sub>2</sub> nanoparticles in nanocellulose hydrogels for biomedical applications. Recently, we successfully dispersed model SiO<sub>2</sub> NPs into cellulose matrix.

HU works with energy related materials (which includes TiO<sub>2</sub>) and focuses on fundamentals, basic chemistry and chemical modification and alterations. HU in co-operation with the HZB equipped with modern and high resolution investigation methods by using synchrotron radiation. HZB is a fully dedicated institute for development and investigations on energy related materials

**October :** APPITA Annual Conference - The Fibre Value Chain Conference & Expo - Distinction Hotel in Rotorua New Zealand from the 12 – 14 October, 2016

*Student Ms Xue Zhang will give an oral presentation.*