



Student Profile:

Praveena Raj

*Bachelor of Engineering
(Chemical), Monash University,
2012*

PhD in progress (at BioPRIA)

*Supervisors: Dr. Warren Batchelor,
Prof. Gil Garnier*



Research focus: nanocellulose-polyelectrolyte complexes

My research addresses the major challenges that the industry is facing in nanocellulose fibre production in terms of process feasibility on a large scale and characterisation of the material. I have also investigated the effect of adding linear and branched polyelectrolytes of varying charge density and molecular weight on its interaction with nanocellulose fibres. This was then correlated with minimising the dewatering time required to form a nanocellulose-polyelectrolyte sheet and to optimise the final sheet properties.

I have successfully collaborated with research groups at the Australian Institute for Bioengineering and Nanotechnology (AIBN), University of Queensland and University of Madrid. Collaboration with the research group at UQ involved work on characterisation of Microfibrillated Cellulose produced using mechanical treatments from Bleached Eucalypt Kraft Pulp and Spinifex fibres in terms of aspect ratio and energy consumption. The focus of the study with University of Madrid was to investigate the flocculation mechanisms between nanocellulose fibres and polyelectrolytes.

Throughout the past 3 years, I have presented my research outcomes at international and domestic conferences. Presenting my work at the International Chemical Congress of Pacific Basin Societies in Honolulu last December was a very valuable experience. Not only was I amongst the experts and top leaders in my field, but I was also given the opportunity to network with my peers and other researchers from all over the world.

Working at BioPRIA has given me the chance to be exposed to both industry and academia. Through participation in BAMI technical reviews and seminars, my communication and presentation skills have improved significantly. I am very grateful to have had the opportunity to work at BioPRIA with colleagues that both challenge me intellectually and help me to grow as an individual researcher.

CONFERENCE HIGHLIGHTS

**30th Australasian Colloid and Surface
Science Student Conference (ACSSSC)**

February 1-4, 2016

Hosted by The University of Sydney, with the Australian National University, at the Kioloa Coastal Campus, NSW

Throughout the four day conference, students enjoyed the opportunity to exchange ideas, share knowledge and network with other researchers from across Australia and overseas. Students gained experience in presenting and discussing their research in a supportive environment and were given constructive feedback by academic staff.

"I have learnt a lot about what other research groups are working/focusing on in their universities and was able to find out which groups work on similar stuff to our group (i.e cellulose based materials). I have gained a lot of practical knowledge, including how to present properly in a conference, as this was my first conference where I did an oral presentation. Also I learnt a lot of new possible techniques, methodologies that I can incorporate into my study."

Uthapala Garusinghe



BAMI Attendees: Pictured (l-r): Praveena Raj (BAMI), Aysu Onur & Ziwei 'Windy' Huang (BioPRIA), Llyza Mendoza & Uthapala Garusinghe (BAMI), Natasha Yeow (BioPRIA)



Norske Skog



Professor Florent Allais

Director of the Chair ABI (Industrial Agro-Biotechnologies)



AgroParisTech, Reims, France

Title: Using white biotechnologies, green chemistry and downstream processing to transform biomass and biorefineries by-products into renewable chemicals such as polymers and functional additives

Abstract:

Under the patronage of the Conseil Régional de Champagne

-Ardenne, the Conseil Général de la Marne and Reims Métropole, AgroParisTech has built a new chair of Industrial Agro-Biotechnologies devoted to the valorization of biomass through white biotechnologies, green chemistry (e.g., biocatalysis) and downstream processing.

With expertise in chemistry, microbiology, process and chemical engineering as well as analytical chemistry, the chair ABI is able to conduct fundamental as well as applied multi-disciplinary research projects. The ambition of the chair is to develop and optimize sustainable industrial processes and high valued-added products from agro-resources (e.g., biorefineries by-products, agro-waste). More precisely, the scientists produce platform molecules (aka synthons), like organic acids or aromatics/phenolics - obtained from fatty esters, polysaccharides and lignocellulosic biomass - that are then used to develop new functional bio-based additives, polymers or materials. The team also works on the production of valuable sustainable chemical intermediates that can be used in chemistry, in the food/feed industry or in cosmetology as antimicrobials, antioxidants, flavors or surfactants to name a few.

Biography

Professor Allais has completed his PhD from the University of Florida in 2004 and postdoctoral studies in the group of Prof. Janine Cossy (ESPCI, Paris, France) and Dr. Jean Boivin (ICSN-CNRS, Gif-sur-Yvette, France). Prof. Florent Allais has presented his research in numerous international conferences, published more than 20 papers in peer-reviewed journals, granted/filed 8 patents, served as reviewer of various journals and as Associate Editor of *Frontiers in Chemistry (Chemical Engineering)*. His research is dedicated to the development and optimization of sustainable industrial processes and high valued-added products from agro-resources (e.g., biorefineries by-products, agro-waste). More precisely, with expertise in white biotechnologies, green chemistry and downstream processing, his Chair aims at the development of platform molecules like organic acids or aromatics/phenolics - obtained from fatty esters, polysaccharides and lignocellulosic biomass - that will be used to create new functional bio-based additives, polymers or materials. The chair also aims at the production of valuable sustainable chemical intermediates that can be used in chemistry, in the food/feed industry or in cosmetology as antimicrobials, antioxidants, flavorings or surfactants to name a few.

News from BioPRIA Services

In addition to Testing Services, BioPRIA conducts literature searches on specific topics for our industry partners. There is a wide range of library resources and services available, with access to journal articles, patents, books and conference papers.

We are continually improving our capabilities, entirely driven by industry requests. For hard-to-find technical resources, contact:

rosiana.lestiani@monash.edu or scot.sharman@monash.edu

For more information about our services, see our website: <http://www.biopria.com.au/>

ANSTO Visit—BAMI Post Doc and students

Ultra-Small Angle Neutron Scattering (USANS) experiment at Australian Nuclear Science and Technology Organisation (ANSTO) at Sydney were performed in the last week of March. The experiments were planned to determine quantitatively the structure information on distribution and flocculation (sizes in 100 nm to 10 μm) of nanocellulose fibre as a function of polyelectrolyte (CPAM, PEI) charge density and molecular weight. Additionally, to get insight into how ionic concentrations (NaCl and CaCl₂) affect the colloidal behaviour of nanocellulose fibres and also what controls the transition between the colloidal and gravitational effects when nanofiber suspensions are settled. Obtained results are promising and further data analysis will allow us to visualize and quantify the conformations present in nanocellulose-polyelectrolyte composite.

BAMI Student Chapter

The BAMI Student Chapter presentation:

The next presentation will be by Ms Xue Zhang—"Fabrication of nanocomposites super hydrophobic paper for packaging materials"

APPI Foundation Trustees Committee Members check out BAMI student's work March 2016

