BioPRIA NEWSLETTER

Message from the Director

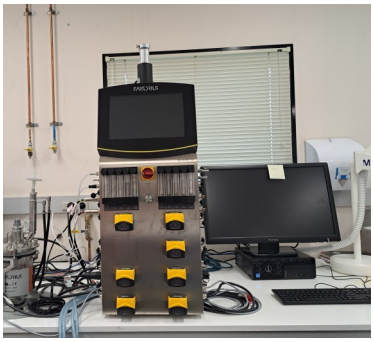
December 2025

As 2025 draws to a close, I would like to take this opportunity to wish you and your loved ones a Merry Christmas and a Happy New Year.

2025 has been a very successful and busy year at BioPRIA. A major highlight has been our successful ARC Training Centre in Sustainable Materials and Responsible Technologies for Packaging (SMaRTPACK) involving a new industry/academia consortium. Granted in June, we are expecting our Partners' Agreement to be signed by the end of the year. This will enable us to recruit staff and welcome 2 cohorts of PhD students over the next 5 years. I am also delighted to welcome Samantha Snowden-Finch as our new dynamic Centre Manager.

There are also 2 new highlights at BioPRIA. First, is the finalization of our Bioengineering laboratory. Lab 101 has been reequipped with a Sartorius fermenter system supporting 2 reactors and a Hamilton STAR microfluidic robotic platform for diagnostic applications. Both units will be used from next year by graduate and undergraduate students, supporting the Biological Engineering platform of our department. We now have the full equipment to produce rapid diagnostics, with a full array of bioprinters, fermenters for biomolecules, and testing instruments to optimize biorecognition.

The second highlight is the creation of our new website which better reflects the continuous transformation of BioPRIA to best support the challenges of research and supporting our industrial partners. Please visit us at www.biopria.com.au or simply search "BioPRIA" on Google—and don't forget to share your feedback!



Thank you for your continued support. Wishing you a joyful festive season and a successful 2026.

Japan, Australia & India Trilateral Collaboration Week: The Kyoto Roundtable FY2025

Prof. Gil Garnier was invited to be part of the panel at this years Kyoto Roundtable. The Kyoto Roundtable was established in 2024 by Kyoto University, together with academics and researchers from Japan, Australia, and India to promote collaborative research among these three nations.

Kyoto University hosted the 2025 Kyoto Roundtable, a week-long program designed to advance research partnerships among Japan, Australia, and India (AIJ). In conjunction with the new AIJ Seed Funding Initiative, the event fostered synergetic collaborations and sustained academic engagement across the Indo-Pacific region. This year's discussions focused on identifying commonalities and strengths within Australian research domains and exploring complementarity among AIJ collaborators to drive impactful joint projects.

Interview- APPITA Magazine- ARC Training Centre in Sustainable Packaging

Prof. Gil Garnier was interviewed by Appita Magazine (Issue 3, 2025 Jul-Sep Edition) after securing an ARC Training Centre in Sustainable Materials and Responsible Technologies for Packaging (SMaRT–Pack).

You can read Gil's interview here discussing the centre's goals and impact on sustainable packaging:

BioPRIA SECURES $7M ARC TRAINING CENTRE IN SUSTAINABLE PACKAGING

INTERVIEW WITH PROFESSOR GIL GARNIER, DIRECTOR OF BIOPRIA

BioPRIA has secured a landmark $7 million Australian Research Council (ARC) Training Centre in Sustainable Materials and Responsible Technologies for Packaging (SMaRT-Pack). Led by Professor Gil Garnier, this five-year initiative will unite researchers, government, and industry to accelerate the transition to more sustainable and responsible packaging solutions.

In an interview with Appita Magazine, Professor Garnier outlined the Centre's vision and priorities.

SMaRT-Pack will address the full lifecycle of packaging - developing next-generation fibre-based materials, advancing recycling and degradation technologies, and establishing measurable standards and frameworks to guide industry and regulators.

"Responsible packaging means designing for function and end-of-life from the outset."

Professor Garnier told Appita Magazine during the interview. "It's about ensuring materials can be effectively recycled or safely degraded, while maintaining performance and value."

One of the Centre's first priorities will be filling a critical gap in standards and measurement methods. "We seek to authentically understand the role that packaging materials play across their lifecycle—whether in intended recycling streams or in terrestrial and marine environments. Only then can we build credible standards and policy insight," he explained.

The Centre expects to deliver immediate benefits for industry on two fronts: accelerating the time to market for fibre-based composite products, and providing rigorous, science-based clarity on sustainability, recyclability and environmental impacts. "Through independent, multidisciplinary collaboration, we will create methods to measure these impacts in ways industry can rely on," Garnier notes.

As an industry training hub, SMaRT-Pack begins and ends with

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industry. Partners - including Visy Varden Process, Papyrus Bio-Innovations, South East Water, Labelmakers, Xefco, and Jet Technology—will help define priority challenges, shape research, and test solutions. "The process starts with companies identifying the strategic issues that matter most, and ends with them applying the knowledge and hiring the graduates trained through the program," says Garnier.

With 2025 and 2030 circular economy deadlines fast approaching, the timing is critical. "Companies are competent at tackling immediate challenges such as energy and cost efficiency. Where SMaRT-Pack adds value is in providing strategic scientific and engineering development, plus the graduates ready to drive long-term change."

Translating research into practice is central to the Centre's design. "We're building a strong, open, and functional consortium of universities, associations, and companies," Garnier notes. "Graduates will be trained from the start to work with industry on complex, high-impact problems."

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Although not a policy-making body, SMaRT-Pack will generate independent, science-based knowledge to underpin robust and enforceable regulation. "This evidence base can influence policy and give industry the confidence to adopt new practices—sometimes even leveraging regulation as a way to secure new markets," Garnier suggests.

With rising costs, global competition, and intensifying sustainability demands, the establishment of SMaRT-Pack positions BioPRIA, its academic collaborators (Monash, Deakin, QUT), and its industry partners at the forefront of redefining what responsible packaging looks like—and how it can be achieved at scale.

8 KEY TAKEAWAYS FROM SMaRT-PACK

- **$7M ARC Centre:** Five-year initiative to transform packaging.
- **Led by BioPRIA:** Directed by Professor Gil Garnier at Monash University.
- **Collaborative network:** Monash, Deakin, and QUT with seven industry partners.
- **Lifecycle focus:** From new materials to recycling, degradation, and policy frameworks.
- **Quick wins:** Fibre-based composites to replace single-use plastics.
- **Industry at the core:** Projects defined by companies, tested with companies, graduates embedded in industry.
- **Workforce pipeline:** Training the next generation of packaging scientists and engineers.
- **Policy impact:** Independent, science-based evidence to support regulation and build market confidence.

IUPESM World Congress on Medical Physics and Biomedical Engineering 2025

PhD candidate Jie-Ning Chuang attended and presented his research at the IUPESM World Congress on Medical Physics and Biomedical Engineering 2025 in Adelaide from 29 September– 4 October held at the Adelaide Convention Centre.
The Congress' theme Bridging the Gap: Science, Technology, and Clinical Practice for a Sustainable World, is aligned with worldwide initiatives of equitable healthcare in a sustainable world.
Jie-Ning's presentation, titled "De novo Binder Design for Personalized Cancer Therapeutics," was featured in the Artificial Intelligence, Machine Learning, and AI Clinical Implementation division. The congress provided an excellent opportunity for Jie-Ning to share his innovative work on AI-designed binders for cancer treatment and to engage with experts to gain valuable insights for future directions in cancer models.

Monash PITCH 2025: Fostering Interdisciplinary Innovation

PhD students Darsan Haridas and Gianluca Vidali had the opportunity to participate in the Monash PITCH (PhD Interdisciplinary Team Challenge) held at Monash University Indonesia. The program brought together PhD students from across Monash's global campuses, encouraging collaboration between STEM and HASS disciplines to develop solutions for real-world challenges aligned with Monash Impact 2030.
Their team explored ways to transform Indonesia's nickel industry into a globally competitive EV battery supply chain hub and proposed a strategic action plan focused on sustainability, workforce development, and equitable community growth.
After this Darsan commented "Working in an interdisciplinary team was a truly enriching experience — it pushed us to think beyond our individual research areas, combine diverse perspectives, and co-create ideas with social, environmental, and economic impact. The event also provided valuable exposure to mentors and experts from academia, industry, and government, broadening our understanding of how research can translate into practical solutions.
Participating in Monash PITCH reinforced the power of collaboration and reminded me that meaningful innovation often emerges at the intersection of disciplines. It was an inspiring experience to represent Monash University, Clayton campus and contribute to discussions shaping sustainable futures."

Congratulations to Dr. Hans Cainglet– PhD Graduate

We were thrilled to celebrate Dr. Hans Cainglet's achievement as he attended the September 2025 graduation ceremony.
His thesis titled "Cellulose nanomaterials for sustainable packaging" was under the supervision of Dr. Joanne Tanner, Prof. Warren Batchelor and Prof. Gil Garnier.
Hans is currently working as a Research Fellow at BioPRIA under the supervision of Prof. Warren Batchelor .
We wish Hans all the very best in the next chapter of his career.

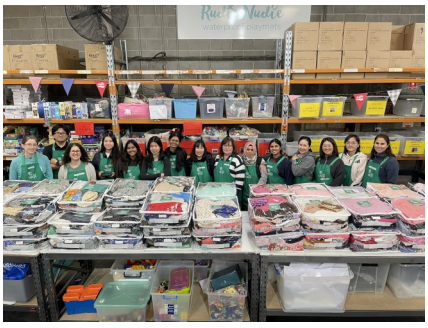
Six Month Visitor to BioPRIA

We have the great pleasure hosting Narumi Nishi to BioPRIA. Narumi is a second-year PhD candidate from Kyoto University, currently visiting Monash University on a six-month research placement until mid-April 2026. Although her academic background is in language education, she belongs to a Green Chemistry laboratory at Kyoto University and is part of an interdisciplinary graduate school program that encourages integrating knowledge across diverse fields. At Monash, her supervisor is Prof. Gil Garnier. At Kyoto University she supervised by Prof. Kei Saito, who previously worked at Monash University. Narumi aims to complete her doctorate in March 2027.

Her primary research at Monash explores teachers' perceptions of Green Chemistry education. In particular, she will be conducting interviews with secondary school chemistry teachers in Victoria to understand their motivations and barriers when adopting new Green Chemistry teaching materials. In addition to this work, she will also conduct research on classical literature education in Japan. During her stay in Australia, she plans to compare classical education practices between Australia and Japan and explore potential connections between classical education and Green Chemistry education.

Monash Volunteering Program

PhD student Zinia Ara recently volunteered at the not for profit organization Our Village at Clayton, which provides essential baby and children's items to families in need.
Zinia registered with the Monash Volunteering Program, which sends out invitations when new opportunities arise. It was her first time volunteering during her PhD—and it turned out to be a truly uplifting experience.
Zinia shares her experience "We all know the mental pressure that comes with the PhD journey. I've always wanted to give back to the community whenever time allows, and this opportunity gave me just that—a chance to recharge through meaningful work.
A group of Monash volunteers visited Our Village, where we received a short training session on what to do and how to do it. We sorted and packed donated clothing and accessories for distribution to families in need. The thought of a child or parent receiving a bag filled with kindness and care was a powerful motivator—it brought a smile to my face and reminded me of the impact small acts can have.
I encourage everyone to engage in something beyond their academic commitments. Volunteering not only creates a positive impact on society but also nurtures our own well-being".



Mahesh Chandra Rander (MCR) Young Researchers Award

In October, Dr Rishabh More received the *Mahesh Chandra Rander (MCR) Young Researchers Award* from the IIT alumni community in Victoria for his work on discovering the origins of yield stress in dilute depletion gels.

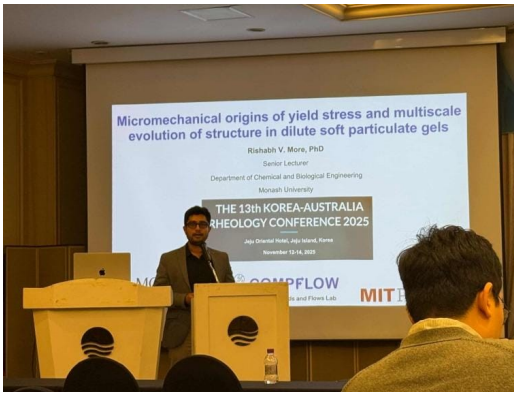
The Mahesh Chandra Rander (MCR) Young Researchers Award celebrates the enduring values of innovation, excellence, and social contribution by early-career researchers from the Indian Institutes of Technology (IIT), residing in Victoria, Australia. The award is in honour of Prof. Mahesh Chandra Rander, and it aims to:

-Recognise outstanding research by IIT alumni under the age of 35

-Encourage young minds to address real-world problems with creative, research-based solutions

-Foster stronger links between academia, industry, and the community in line with IITAV's mission.

The 13th Korea-Australia Rheology Conference



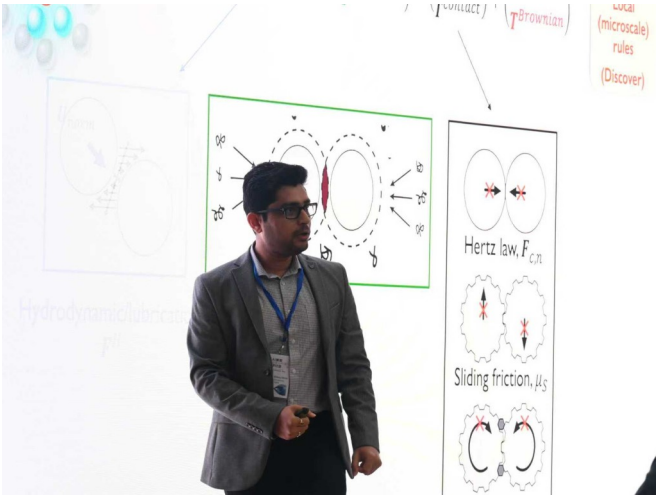
Dr Rishabh More was invited to participate in the Korea-Australia Rheology Conference held in Jeju Island, Korea from November 12-14th, 2025. The conference provides an international forum to showcase rheological research in Korea and Australia and offers a platform for presenting the latest results on various aspects of the rheological and flow properties of materials.

Rishabh gave a seminar titled: "Micromechanical origins of yield stress and multiscale evolution of structure in dilute soft particulate gels".

While in Korea, Rishabh was also invited to Seoul National University by Prof Jaewook Nam where he met many Korean colleagues including Prof Kyung Ahn.

AI-Enabled Rheology Modelling and HPC Algorithms

Dr Rishabh More was also invited to give a keynote talk at the AI-Enabled Rheology Modelling and HPC Algorithms in Beijing on Nov. 17-18th, 2025, a workshop organized by the president of Chinese Society of Rheology Prof. Yuan Xue-Feng.



ICOSEM 2025

Prof. Warren Batchelor was an invited keynote speaker at the 6th International Conference on the Science and Engineering of Materials (ICoSEM 2025) held on 26-27 November in Kuala Lumpur, Malaysia.
This conference was hosted by the Centre for Advanced Materials (CAM), Universiti Malaya, in collaboration with NYCU Taiwan, IEEE-EPS Malaysia Chapter and Manipal University Jaipur. The conference, held once every two years, brings together researchers, academics and industry experts to collaborate and share innovations in materials science and engineering.
Warren's presentation title: *Cellulose Nanofibril Characterisation*
Abstract: Nanocellulose has been a well-established area of research for several decades; however, progress in its production, application, and utilization has been hindered by the lack of measurement standards. Measurement techniques often involve significant trade-offs; for example, optical fibre analysers offer quick results but fail to detect most fibres in a nanocellulose sample. On the other hand, scanning electron microscopy (SEM) is slower due to sample preparation and image analysis requirements but is generally capable of imaging most fibrillar elements in a sample. I have been part of a ISO task group within the pulp and paper committee, TC6, working on developing nanocellulose measurement standards within ISO. The first part of this talk will focus on the group's work and the process of identifying priorities for standard method development, with a particular focus on size measurement techniques. The second part of this talk will discuss the current focus area of cellulose nanofibril size measurements using SEM.

Latest Publications

Hans Estrella Cainglet, Darsan Haridas, Rico F Tabor, David Joram Mendoza, Gil Garnier, Warren Batchelor, Joel F Hooper, Joanne Tanner ,**Engineering cellulose nanofibril–polylactide composite films for high water vapor barrier food packaging** https://doi.org/10.1016/j.jcis.2025.139569

Gianluca Vidali, David Joram Mendoza, Cameron Bentley, Alasdair I McKay, Vikram Singh Raghuwanshi, Jitendra Mata, Gil Garnier, Joel F Hooper **Single-Step Grafting of a Thermoresponsive RAFT Polymer from Nanocellulose by Radical Decarboxylation** https://doi.org/10.1021/acspolymersau.5c00115

Barricella, S., Putera, K. H., Haritos, V. S., Freeman, B. D., & Garnier, G. (2025). **Chiral amines production by compartmentalized enzymes in membrane-based flow bio-catalysis. Separation and Purification Technology, 377(Part 3),** Article 134415. https://doi.org/10.1016/j.seppur.2025.134415

Limna Suja Shaji, Saumya Saji Kochumoni, Benjamin J. Allardyce, David A.V. Morton, Warren Batchelor, Naghmeh Nasiri and Rangam Rajkhowa, **Protein Papers from Microfibrillated Silk for Biomedical Membrane Applications**, Colloids and Surfaces B: Biointerfaces, (2025) doi:https://doi.org/10.1016/j.colsurfb.2025.115329

Karimi, S., Yucel, S., Moon, R. J., Johnston, L. J., Bechle, N. J., Batchelor, W., Cho, J. Y., & Kalidindi, S. R. (2025). **A semi-automatic workflow for atomic force microscopy image analysis and cellulose nanocrystal particle size measurements.** Cellulose, 32, 7535–7552. https://doi.org/10.1007/s10570-025-06690-w

Bhattathiri, P. V., Batchelor, W., Patti, A., & Arora, A. (2025). **Techno-economic evaluation of multiple product scenarios from pineapple leaf waste in integrated biorefinery.** Bioresource Technology Reports, 32, Article 102321. https://doi.org/10.1016/j.biteb.2025.102321

Nadeem, H., Nimmegeers, P., Batchelor, W., & Billen, P. (2024). **Cellulose nanofibre films as a substitute for plastic packaging: A comparative environmental life cycle assessment**. Food and Bioproducts Processing, 145, 175-186. https://doi.org/10.1016/j.fbp.2024.03.005

Sharma, V., Devkota, L., Kishore, N., & Dhital, S. (2025). **Understanding the interplay between dietary fiber, polyphenols, and digestive enzymes. Food Hydrocolloids,** 166, Article 111310. https://doi.org/10.1016/j.foodhyd.2025.111310

Perera, D., Devkota, L., Shrestha, S., Bhattarai, S. P., Panozzo, J., & Dhital, S. (2026). **Hard-to-cook (HTC) phenomenon associated changes in protein and lipid profile of faba and adzuki beans.** Food Hydrocolloids, 171, Article 111803. https://doi.org/10.1016/j.foodhyd.2025.111803

Li, H. T., & Dhital, S. (2025). **Designing carbohydrate-enriched foods: tailoring glucose release from cereal grains. In B. Zhang, & S. Dhital (Eds.), Carbohydrate Nutrition** (1st ed., pp. 349-371). Elsevier. https://doi.org/10.1016/B978-0-443-15700-4.00001-8

Wang, J., Wu, P., Chen, X. D., Yu, A., & Dhital, S. (2025). **Effect of Food Matrix and Administration Timing on the Survival of Lactobacillus rhamnosus GG During In Vitro Gastrointestinal Digestion**. Foods, 14(17), Article 3076. https://doi.org/10.3390/foods14173076

Perera, D., Jia, B., Devkota, L., Bhattarai, S. P., Panozzo, J., & Dhital, S. (2025). **High temperature and humidity storage alter starch properties of faba (Vicia faba) and adzuki beans (Vigna angularis) associated with hard-to-cook quality**. Carbohydrate Polymers, 351, Article 123119. https://doi.org/10.1016/j.carbpol.2024.123119

Le, D. T., Williamson, G., Devkota, L., & Dhital, S. (2025). **Leaching and proposed recovery strategies of (poly)phenols and oligosaccharides from hydration wastewater during legume processing**. Trends in Food Science and Technology, 158, Article 104924. https://doi.org/10.1016/j.tifs.2025.104924

Devkota, L., Kumar, G., Zhang, P., Raghuwanshi, V. S., & Dhital, S. (2025). **Legume protein composition influences texturization during high temperature protein-starch complexation.** Food Hydrocolloids, 164, Article 111213. https://doi.org/10.1016/j.foodhyd.2025.111213

Dhakal, D., Muir, J., Ni, D., & Dhital, S. (2025). **Lupin protein isolates influence the nutrition, rheology, and protein profile of lupin-oat yoghurt analogues through probiotic activity**. Food Hydrocolloids, 169, Article 111618. https://doi.org/10.1016/j.foodhyd.2025.111618

Zhu, H., Li, H. T., Fan, X., Wang, T., & Dhital, S. (2025). **Modification of cellulosic structures from fruit by-products: Toward better nutritional properties.** Food Research International, 214, Article 116604. https://doi.org/10.1016/j.foodres.2025.116604

Zhang, B., Zhu, J., Kontogiorgos, V., & Dhital, S. (2025). **Pectin: chemical structure and health benefits.** In B. Zhang, & S. Dhital (Eds.), Carbohydrate Nutrition (1st ed., pp. 237-267). Elsevier. https://doi.org/10.1016/B978-0-443-15700-4.00008-0

Zhang, B., & Dhital, S. (2025). Preface. In B. Zhang, & S. Dhital (Eds.), ***Carbohydrate Nutrition*** (1st ed., pp. xxi-xxi). Elsevier. https://doi.org/10.1016/B978-0-443-15700-4.00018-3

Xiong, W., Zhang, B., Bodjrenou, D. M., & Dhital, S. (2025). **Resistant starch: in vitro fecal fermentation characteristics and health implications.** In B. Zhang, & S. Dhital (Eds.), Carbohydrate Nutrition (1st ed., pp. 125-158). Elsevier. https://doi.org/10.1016/B978-0-443-15700-4.00012-2

Kumar, G., Hooper, J. F., Li, E., Devkota, L., & Dhital, S. (2025). **Ultrasound-assisted hydration offers a novel approach to anneal in-situ pinto bean starch.** Carbohydrate Polymers, 360, Article 123602. https://doi.org/10.1016/j.carbpol.2025.123602

Welcome to BioPRIA

We welcome Samantha Snowden-Finch to BioPRIA , as our ARC Training Centre in Sustainable Materials and Responsible Technologies for Packaging (SMaRT-Pack) Training Centre Manager.
Sam is currently (until December) also the Centre Manager for the ARC Training Centre for Green Chemistry in Manufacturing under Professor Tony Patti's Directorship within the Science faculty. She has worked at Deakin University, RMIT, and ACU. Outside of universities, she has experience in national, state, and local government, project management consulting, and advocacy associations. Outside of work, Sam likes to sew, read, hike and motorbike riding.

Mohammadamin Zakerisfahani obtained his Bachelor's and Master's degrees in Mechanical Engineering from the University of Tehran in 2021 and 2024, respectively. Prior to commencing his PhD, he worked on the development of pH-responsive microparticles using droplet-based microfluidics for targeted drug delivery applications.
He joined BioPRIA as a PhD student in August under the supervision of Dr. Amin Valiei from the department of Chemical and Biological Engineering and A/Prof. Reza Nosrati from the department of Mechanical and Aerospace Engineering. His research explores the impact of the reproductive tract microbiome on infertility, with a focus on mechanistic insights and microfluidic modelling.

Congratulations Sawaira

Congratulations to PhD student Sawaira and her family.
She is excited to share the joyful news they have been blessed with beautiful baby girl!
Warmest congratulations to her and family and wishing them happiness, health and precious moments during this special time.

Conferences of Interest

Appita Conference-FutureProof 2026
Wednesday 25th & Thursday 26 March 2026
Hyatt Place, Essendon Fields, Melbourne, Victoria
Visit https://appita.com/about-2026

ABC of Pulp and Paper Course (New Zealand)
Tuesday, 10th March 2026
Tawa Room, Distinction Hotel
Rotorua, New Zealand
To register: Click Here

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