**Spinifex Nanocellulose Nanotechnology: The Uniqueness and Industrial Applications**

*Pratheep K. Annamalai1\*, Céline Chaléat1, Alireza Hosseinmardi1, Nasim Amiralian1, Emilie Gauthier1, Liam Pooley1, Katarzyna Kępa1, Darren Martin1*

1 Australian Institute for Bioengineering & Nanotechnology, The University of Queensland, St Lucia, Queensland, Australia, 4072

Nanocellulose is a versatile functional nanomaterials and it can be derived from all the lignocellulose biomass, marine animals and through bacterial engineering. It has a potential to be utilised in plethora of advance engineering applications, from both the sustainability perspectives (economy and environment) and new functionalities that can offer. In 2012, we have discovered that long and thin nanofibres can be isolated from an Australian native arid grass spinifex and found that this nanocellulose can retain the cell wall constituents, hemicellulose and lignin, owing to the C4 leaf anatomy of these extremophile species. This results in effortless fibrillation, and consequently, cost-effective production of excellent longer and more flexible nanofibres.(Amiralian et al., 2015a; Amiralian et al., 2015b) This unique combination opens up an opportunity for tunability in residual lignocellulosic composition, morphology and the physical and mechanical properties with high product yield, through various chemical pre-treatments and surface modifications.

Since the discovery, we have explored the use of spinifex nanocellulose in various applications for various industry sectors (Amin et al., 2016; Gaddam et al., 2017; Jiang et al., 2017) and found some limitations and challenges in translation.

This presentation will give an overview of our team’s translational research activities in clever applications including ultrathin dipped elastomer products,(Hosseinmardi et al., 2017) polymer composites (Amin et al., 2016), recycling papers and cementitious materials. This will also include the discussion on “why nanotechnology to be utilised in these industry sectors” for improving the performance and sustainability and adding new functions to these products.

**References**
Amin, K.N.M., Amiralian, N., Annamalai, P.K., Edwards, G., Chaleat, C., Martin, D.J., **2016.** *Chem Eng J* 302, 406-416.

Amiralian, N., Annamalai, P.K., Memmott, P., Martin, D.J., **2015a.** *Cellulose* 22, 2483-2498.

Amiralian, N., Annamalai, P.K., Memmott, P., Taran, E., Schmidt, S., Martin, D.J., **2015b.** *Rsc Adv* 5, 32124-32132.

Gaddam, R.R., Jiang, E., Amiralian, N., Annamalai, P.K., Martin, D.J., Kumar, N.A., Zhao, X.S., **2017.** *Sustain Energ Fuels* 1, 1090-1097.

Hosseinmardi, A., Annamalai, P.K., Wang, L., Martin, D., Amiralian, N., **2017.** *Nanoscale* 9, 9510-9519.

Jiang, E., Amiralian, N., Maghe, M., Laycock, B., McFarland, E., Fox, B., Martin, D.J., Annamalai, P.K., **2017.** *ACS Sustainable Chemistry & Engineering* 5, 3296–3304.

**Corresponding author:** *Annamalai PK*: p.annamalai@uq.edu.au