**3D printing and nanomaterials**

*Kate FoxA, Aaqil RifaiA, Avik SarkerA, Nhiem TranB and Phong TranC*

ASchool of Engineering, RMIT University, Melbourne, VIC, Australia.

BSchool of Science, RMIT University, Melbourne, VIC, Australia.

CInstitute of Health and Biomedical Innovation, Queensland University of Technology, Kelvin Grove, QLD, Australia

|  |
| --- |
| In this talk I will discuss the recent advances in the use of 3D printing in medicine from augmentation and implantation focusing on the realities of both metallic printing and bio-printing long term. I will also present recent results on new materials for implants with a goal of transitioning engineering biology into the realm of medicine. Here we will discuss recent results on the use of nanomaterials as an implant coating material which show that a 3D printed titanium implant can readily change its interaction with both cells and bacteria via the addition of a nanodiamond coating1. We will also discuss our recent finding regarding the affect of nano- and micro- particles seen upon naked selective laser melted titanium implants that show that the interface of the implant and its interaction with surrounding cells can be modified in the additive manufacturing design phase2. |

**References**

1. Aaqil Rifai, Nhiem Tran, Phillip Reineck, Aaron Elbourne,Edwin Mayes, Avik Sarker, Chaitali Dekiwadia, Elena P. Ivanova, Russell J. Crawford, Takeshi Ohshima, Brant C. Gibson, Andrew D. Greentree, Elena Pirogova and Kate Fox(2019)Engineering the Interface: Nanodiamond Coating on 3D-Printed Titanium Promotes Mammalian Cell Growth and Inhibits *Staphylococcus aureus* Colonization, *ACS Appl. Mater. Interfaces*, 11, 27, pp 24588-24597
2. A Sarker, N Tran, A Rifai, J Elambasseril, M Brandt, R Williams, M Leary, Kate Fox 2018 “[Angle defines attachment: Switching the biological response to titanium interfaces by modifying the inclination angle during selective laser melting](javascript:void(0))”, *Materials and Design*, vol. 154, pp326-339