

## **Title: Intra-articular nanoparticles based therapies for osteoarthritis management**

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Osteoarthritis (OA) remains a major unmet clinical challenge with limited disease-modifying therapies. Intra-articular delivery provides a localized treatment strategy, but rapid joint clearance and poor tissue targeting limit its effectiveness. Nanoparticle-based systems offer a promising solution by enabling sustained retention, controlled release, and improved delivery efficiency within the joint microenvironment. In this presentation, we report our group's recent advances in integrating proteomics-guided disease profiling with rational nanoparticle design for OA treatment. These include engineered nanoparticles capable of enhanced cartilage interaction and multi-functional delivery of anti-inflammatory and regenerative agents. In preclinical OA models, our nanoparticle platforms demonstrate improved joint retention, reduced inflammation, and cartilage protection compared to conventional treatments. This work highlights a proteomics-informed nanomedicine strategy for developing next-generation disease-modifying therapies for osteoarthritis.

### **Biography**

Dr. Chun Xu is an Associate Professor and Sydney Horizon Fellow at The University of Sydney. Prior to this, he was a Senior Lecturer and Group Leader at The University of Queensland. He received his PhD in Biomedical Engineering and Nanotechnology from The University of Queensland, Australia, in 2016. He also holds a Master of Dental Surgery (MDS) in Oral and Maxillofacial Surgery and a Bachelor of Dental Surgery (BDS). His research focuses on nanotechnology and biomedical engineering. He has published over 140 peer-reviewed scientific papers in leading journals, including Nature Reviews Bioengineering, Angewandte Chemie, Advanced Materials, and Advanced Science, and holds several patents. His publications have received more than 9,400 citations, with an h-index of 56. He is a regular reviewer for numerous scientific journals, as well as for NHMRC and ARC grant applications. He serves as an Associate Editor for Journal of Nanobiotechnology and Nano TransMed, and is a member of the editorial workgroup for National Science Review.

