**Nano surfaces and early inflammatory responses in tissue regeneration**

Yin Xiao 1,2

*1* *Program leader, Institute of Health and Biomedical Innovation, Queensland University of Technology*

*2* *Director of Australia-China Centre for Tissue Engineering and Regenerative Medicine*

Native tissue repair and regeneration are initiated by the infiltration of inflammatory cells, which not only scavenge the damaged tissues, but also regulate cytokines for stem cell recruitment and differentiation. Functional biomaterials are designed to enhance tissue regeneration by activation of stem cell differentiation, regulation of local tissue inflammatory reaction and angiogenesis. The early inflammation and immune cells influxes into the injury sites after the application of biomaterials are critical in the subsequent cascade of tissue healing processes. The unique biomaterials-inflammation microenvironment determines the outcome of tissue regeneration. Our current strategies on the development of functional nano surfaces of biomaterials for skeleton tissue regeneration point out that manipulation of inflammatory cells, such as macrophages, polymorphonuclear neutrophils (PMNs), dendritic cells can significantly control the osteo-immune responses, leading to stem cell differentiation and bone regeneration.