



The Chinese University of Hong Kong
Department of Biomedical Engineering



Graduate Seminar – PhD Oral Defence

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Supervisor : Prof. BIAN Liming
Date : May 18, 2018 (Friday)
Time : 10:00 a.m.
Venue : Room 513 William M W Mong Engineering Building

Title: Bisphosphonate-Based Nanocomposite Hydrogels for Regulation of Stem Cell Behaviors and Tissue Regeneration

Abstract

Hydrogels are formed through the crosslinking of hydrophilic polymer chains in an aqueous environment. Among different biomaterials, hydrogels are one of the promising candidates for applications in regenerative medicine because their physical, chemical, electrical, and biological properties can be engineered to emulate those of biological tissues. Over the last decades, a range of nanoparticles (NPs) are combined with the polymeric network to obtain nanocomposite hydrogels. These NPs physically or covalently interact with the polymeric chains and give rise to novel properties of the nanocomposite network. Incorporation of NPs via *in-situ* precipitation in the polymer matrix further enhances these desirable hydrogel properties. However, the non-cytocompatible pH, osmolality and lengthy duration typically required for such *in-situ* precipitation strategies precludes cell encapsulation in the resultant hydrogels.

Therapeutic metal ions, such as magnesium ions (Mg^{2+}), not only regulate the cellular behaviors but also stimulate local bone formation and healing. However, the effective delivery and tailored release of Mg^{2+} remains a challenge, with few reports on hydrogels being used for Mg^{2+} delivery. Meanwhile, bisphosphonate (BP) exhibits a variety of specific bioactivities and excellent binding affinity to multivalent cations. Therefore, this thesis work aims to develop novel nanocomposite hydrogels based on the interaction between BP and metallic ions such as Mg^{2+} to address the limitations in the fabrication and cytocompatibility of the conventional nanocomposite hydrogels for expanded applications in tissue engineering and regenerative medicine.

*****ALL ARE WELCOME*****

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