

Carleton University
Department of Mechanical and Aerospace Engineering

Graduate Seminar Series

Friday October 2nd, 2020, 1:00 - 2:00 PM EDT (Ottawa Time)

Biomaterials in Orthopaedic Practice at a Glance

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Abstract

The orthopaedics field has benefited greatly from the enormous research work on the biomaterials. However, many challenges remain to be conquered in the development of new biomaterials that will improve the performance of bone reconstruction and the clinical results in the orthopaedic practice. This presentation will give an overview on the types of biomaterials in orthopaedic, the main fundamental requirements that orthopaedic devices must fulfil to function adequately, examples on the injectable biomaterials and the challenges that could exist in the minimally invasive operations. Also, the presentation will discuss the current research on the active biomaterials for bone tissue regeneration with the consideration of regulatory and market needs.

Bio

Dr. Mohamed Habib received his Ph.D. and postdoctoral fellowship at the biomechanics laboratory, Faculty of Engineering, Sherbrooke University, Canada. He worked on the development of the electromechanical solution to the limited injectability of the hydraulic calcium phosphate paste in the minimally invasive operation. This solution was based on both systematic rheological and physiochemical investigations. He collaborated with DePuy Synthes Spine, to compare the leakage and flow behavior of two of DePuy's bone cement delivery systems used for Vertebroplasty. Dr. Habib received his faculty position at Al-Azhar University, Cairo, where he acquired a wide range of teaching experience and his research activities was focused on the synthesis and the characterization of nano-bone substitutes and the study of their in vitro/in vivo behavior. He has co-authored several articles in international conferences, peer reviewed journals such as Acta Biomaterialia and Tissue Engineering: Part A. Also, he co-authored a US patent for a novel bone cement delivery system. Further, he is a licensed Professional Engineer of Ontario-Canada (PEO) since 2012.



In April 2018, Dr. Habib joined the Orthopaedic Surgery Department at UCSF as a visiting scholar in Dr. Jeffery Lotz laboratory, where he had a fruitful collaboration with Orthofix Co. He studied the control of stem cells behavior in bone regeneration by using a specific active magnetic nano-bone substitute that he has developed. In May 2019, Mohamed has joined Dr. Fields laboratory in the same department as an Associate Specialist with a research focus on the Cartilage End Plate (CEP) permeability enhancement and biomechanics. In this research, he is trying to characterize the effects of enzymatic CEP treatment on the whole-disc biomechanical properties and solute transport. In the same context, his main objective is to devise tools and delivery techniques for evaluating the translational potential of spinal therapies to mitigate intervertebral disc degeneration.