Susmita Bose
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Host: Tom Webster
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"Calcium Phosphate Ceramics in Bone Tissue Engineering"

Friday, September 26
108 Snell Engineering
11:45 a.m. – 1:00 p.m.

Refreshments will be served

ABSTRACT There are an estimated one million bone grafting procedures performed annually in the U.S. and a few million worldwide to repair fractures, craniomaxillofacial defects, bone defects, tumors, as well as hip and knee replacements. With aging population and sports related injuries, the number of procedures increases in musculoskeletal disorder. World dental implant and bone graft market could top $6 billion by 2014, and hip and knee implants market to reach $21 Billion by 2016. Calcium phosphate (CaP) ceramic being compositionally similar to the inorganic part of bone, show significant promise towards drug delivery and bone graft applications. We have processed 3D printed CaP scaffolds for bone tissue engineering with different inorganic oxide dopant chemistry where chemistry plays a vital role in controlling resorption or degradation kinetics, mechanical strength, and biological properties of resorbable CaPs. 3D interconnected channels in CaP scaffolds provide pathways for micronutrients, improved cell-material interactions, and increased surface area allows improved mechanical interlocking between scaffolds and surrounding bone. *In vivo* studies show improved osteogenesis and angiogenesis in 3D printed scaffolds. These systems with controlled strength degradation and drug release kinetics, show promise for use in bone tissue engineering applications. We have also shown that the doped CaP coated metal implants, using induction plasma spray system, enhances *in vitro* cell material interactions and osseointegration *in vivo*. In these coated implants, coating interfacial strength is increased while the dopants have effects on antibacterial properties as well as osteoblast and osteoclast cell performance. The presentation will include recent scientific and technological advances towards developing next generation ceramics, composites and scaffolds for bone implants and drug delivery.

BIOGRAPHY Susmita Bose is a Professor in the School of Mechanical and Materials Engineering, an affiliate professor in the Department of Chemistry at Washington State University (WSU). In 2004, Dr. Bose received the prestigious Presidential Early Career Award for Scientist and Engineers (PECASE, the highest honor given to a young scientist by the US President at the White House) award from the National Science Foundation. Dr. Bose was named as a "Kavli fellow" by the National Academy of Sciences. In 2009, she received the prestigious Schwartzwalder-Professional Achievement in Ceramic Engineering (PACE) Award, and in 2014 Richard M. Fulrath Award, which is an international award given to one academician in the US annually (below age 45), from the American Ceramic Society. Dr. Bose is editorial board member for several international journals, including Acta Biomaterialia, Journal of the American Ceramic Society, Journal of Materials Chemistry B, International Journal of Nanomedicine and Additive Manufacturing. Dr. Bose has published over 200 technical papers with ~ 5000 citations, "h" index 40. Dr. Bose is a fellow of the American Institute for Medical and Biological Engineering (AIMBE) and the American Ceramic Society (ACerS).