IOWA STATE UNIVERSITY
Department of Mechanical Engineering

Defect Engineered Oxides and their role in Oxidative Stress

Sudipta Seal

Department of Materials Science and Engineering
University of Central Florida

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Seminar host: Sonal Padalkar

Abstract

Rare earth (Re) oxides are often applied as coatings to effectively protect steels from high temperature degradation. However, in nanoscale, these oxides have lot of defects and recently we discovered the unique antioxidant properties of these oxides, where it protects mammalian cells against damage caused by increased reactive oxygen or nitrogen species, and has been shown to act as effective superoxide dismutase mimetic in vitro.

In particular, Re-NPs trigger angiogenesis by modulating the intracellular oxygen environment and stabilizing hypoxia inducing factor 1alpha endogenously. Furthermore, correlations between angiogenesis induction and Re-NPs physicochemical properties including: surface valence state ratio, surface charge, size, and shape were also explored. This presentation will provide a brief overview of the applications of these nanostructures in treatment of disorders caused by reactive oxygen species.

Dr. Sudipta Seal, FASM, UCF Trustee Chair, Distinguished Professor and UCF Pegasus Professor, joined the Advanced Materials Processing and Analysis Center (AMPAC) and Mechanical Materials Aerospace Engineering at the University of Central Florida in Fall 1997 after a postdoctoral work at Lawrence Berkeley National Laboratory, University of California, Berkeley. He served as a Director of Nanoscience Technology Center and AMPAC (>30 faculty) till 2017. In 2017, he is selected to Chair the Materials Science and Engineering. At UCF, he pioneered nanostructured cerium oxide and other metal/oxide platforms (micro to nano) and discovered its antioxidant properties and applied in various biomedical problems.

He is the recipient of the 2002: Office of Naval Research Young Investigator Award (ONR-YIP). Elected to attend the Frontiers of Eng Symposium by National Academy of Engineering and Fellows of FASM, FAAAS, FAVS, FIoN, FAIMBE, FNAI, FECS. He received his BTech-Hons from Indian Institute of Technology (KGP) in Metallurgy and Materials Eng, worked for TATA Steel India, MMet, University of Sheffield, UK, and Ph.D. from U Wisconsin (UWM). Currently serving on ASM Board of Trustees. He has 64 issued patents (and many pending), and h index > 78 and his technology is responsible for various startups/licensing.

This seminar counts towards the ME 600 seminar requirement for Mechanical Engineering graduate students.

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