Dr. Jagjit Nanda completed his Doctoral in 2000 at the Indian Institute of Science, Bangalore, India, in Solid State and Structural Chemistry and Materials Science under Advisor: Professor D. D. Sarma. His Dissertation title was “Electronic Structure and Photophysical Study of Semiconducting Nanoparticles.” As part of graduate thesis work Dr. Nanda worked on synthesis and characterization semiconducting nanocrystallites and core-shell nanostructures using colloidal methods. Performed X-ray and UV Photo-electron spectroscopy to study their electronic structure and correlate to their optical and photoluminescence properties.

Dr. Nanda did his Postdoctoral work from 2000-2002 under Advisor Professor Michael D. Fayer in the Department of Chemistry at Stanford University, California. Dr. Nanda developed a femtosecond Vis-NIR pump-probe transient absorption set up for studying photo-induced electron transfer. Studied photoinduced forward and geminate recombination rates and their mechanisms between Rhodamin 3B and Dimethyl Acetamide (DMA) and dye sensitized solar cells.

Dr. Nanda worked Los Alamos National Laboratory from 2002-2005 where his research focused on semiconducting, nanostructures, and photonic materials. Dr. Nanda’s focus area at Ford Research Laboratory from 2005-2009 was energy storage, spectroscopy, and nanoscience. Dr. Nanda has been at Oak Ridge National Laboratory since 2009. His research is in the area of high energy density electrical energy storage materials, and interfacial phenomena.

TITLE
“High Voltage Redox Chemistries and 3D Electrode Architectures for Advanced Lithium Batteries and Beyond”

ABSTRACT
Dr. Nanda will cover a general overview of the current state-of-the-art lithium-ion based batteries and will address various scientific issues and challenges associated with alternate high-energy-density chemistries such as lithium-air and lithium-sulfur. A major part of the talk will cover ongoing research efforts in the group that includes investigations of high-energy layered lithium-rich compositions: xLiMnO2.(1-x)LiMO2 (where M = Ni, Mn, Co) and multivalent conversion-based compounds belonging to iron fluoride and oxyfluoride family. Dr. Nanda shall discuss several approaches going on in our laboratory to incorporate nanostructures of the above family of multivalent electrode materials in various 3D electrode architectures to facilitate electronic and/or ionic transport that would further enable multi-electron capacity without structural collapse. These include some recent results on 3D carbon-fiber-based network and inverse opal-based bicontinuous architectures.