

## Advanced Manufacturing Seminar Series

Friday, April 2, 2021

10:00 AM – 11:30 AM (Pacific Time)

Registration link: [https://usc.zoom.us/webinar/register/WN\\_T8lmZM0nQhC8VeoLUjTaA](https://usc.zoom.us/webinar/register/WN_T8lmZM0nQhC8VeoLUjTaA)

### *Solid Ionics-Based Nanomanufacturing*

**Dr. Placid M. Ferreira**

Tungchao Julia Lu Professor, Department of Mechanical Science and Engineering

University of Illinois at Urbana-Champaign

*Abstract:* Mechanics and transport at the micro- and nanoscale offer a rich set of controllable phenomena that can be exploited for the development of manufacturing processes, compatible with these scales. Here, we exploit ionic transport in solids as the basis of highly controllable, efficient, high-resolution, high throughput nanomanufacturing processes for producing metallic (specifically silver and copper) nanostructures.

This talk will focus on the exploitation of the high room-temperature ionic conductivity of silver and copper-based superionic glasses as the basis of subtractive and additive nano-manufacturing processes such as superionic imprinting/stamping, roll patterning and direct writing. Taking a traditional manufacturing perspective, the talk will discuss tooling and tool materials; process characterization and rates; and tool wear with such processes. Applications and future directions for solid ionics-based nanomanufacturing processes will also be discussed.



*Biography:* Dr. Placid M. Ferreira is the Tungchao Julia Lu Professor of Mechanical Science and Engineering at Illinois. From 2003 to 2009, he was the director of the Center for Chemical-Electrical-Mechanical Manufacturing Systems (Nano-CEMMS), an NSF-sponsored Nanoscale Science and Engineering Center after which he served as the Head of the Department of Mechanical Science and Engineering at Illinois until August 2015. He graduated with a PhD in Industrial Engineering from Purdue University in 1987, M.Tech (Mechanical) from IIT Bombay, 1982 and B.E. (Mechanical) for University of Bombay in 1980. He has been on the mechanical engineering faculty at Illinois since 1987, serving as the associate head for graduate programs and research from 1999 to 2002. Professor Ferreira's research and teaching interests are in precision manufacturing and includes computer-controlled machines, nano-manufacturing and metrology. Professor Ferreira received NSF's Presidential Young Investigator Award in 1990, SME's Outstanding Young Investigator Award in 1991, University of Illinois' University Scholar Award in 1994, ASME's Ennor Award for Manufacturing Technology in 2014. He is also a Fellow of ASME, SME and AAAS. He has served on the editorial board of a number of manufacturing-related journals.