

**Laser-plasma induced synthesis of high purity nanomaterials in liquids with enhanced physical, chemical, thermal and transport properties; and Cold plasma technologies for surface treatment, microbial and chemical deactivation, and biomedical applications**

**Professor Magesh T. Rajan**

Electrical and Computer Engineering  
South Dakota School of Mines and Technology

(1) Advanced laser-plasma based manufacturing and processing of advanced nanomaterials and nanoliquids is a growing area of research and has significant potential for wide range of industrial and medical applications. Laser-plasma induced nanofluids are a new class of nanofluids engineered by generating and dispersing <100 nm nanomaterials directly in liquids, in contrast to conventional gas phase processes which often result in agglomeration and contamination due to complex chemical syntheses employed resulting in inconsistent results. Due to a nanoscale colloidal suspension containing condensed nanomaterials, the laser based manufacturing of nanofluids possess highly enhanced physical, chemical, thermal and transport properties compared to the base fluids. The advanced laser-based manufacturing and processing of advanced nanomaterials and nanoliquids demonstrates the great potential of nanofluids to a range of applications across several disciplines in engineering and science. (2) The non-thermal or 'cold' plasma technologies developed at atmospheric pressure conditions resulted in rapid growth of this field over the last decade. Our research involving design and development of diverse atmospheric pressure cold plasma technologies targeted for applications including bio-chemical deactivations, polymer surface modifications, medicine and biomedical applications will be presented.



**Magesh Rajan** is a professor and head in the Electrical and Computer Engineering (ECE) department at South Dakota School of Mines and Technology. He received his PhD in laser multi-photon and cascade ionization and optical laser diagnostics from University of Wisconsin-Madison. He was the Director for Laser and Plasma Engineering research program and tenured associate professor at the Texas A&M University-CC and a Graduate Faculty at Texas A&M University-College Station. He has led funded research in the

areas of advanced laser based manufacturing technologies and cold plasma technologies, funded through DOD, DARPA, NSF, NASA and other agencies.

He has published two books and over 100 original research publications. He holds a degree in business administration (MBA) and a licensed professional

engineer (PE), ABET program evaluator, six-sigma green belt license holder. He is a senior member of IEEE and Nuclear and Plasma Sciences Society

(NPSS), and a Life Member of Laser Institute of America (LIA) and Society of Photo-Optical Instrumentation Engineers (SPIE). He is a recipient of several awards including the Corpus Christi person of the year awards and Texas

A&M-CC excellence in teaching innovation, excellence in research and scholarly activities, research excellence - wall of fame, outstanding islander awards.

**When: Tuesday, September 19, 2017 at 4 pm**

**Where: EEP252**