

Title: Advanced Nanofabrication Technique for Synthesis of Nanosensing Structures and Energy Materials

Lecturer: Associate Professor Amirkianoosh Kiani – PhD, Peng

Department of Mechanical & Manufacturing Engineering, Ontario Tech University

Abstract:

Nanostructured materials are rapidly gaining interest among researchers due to their exceptional optical, biological, and mechanical properties, which differ from those of bulk form materials. The structural nanomobility and nanoflexibility observed in nanostructures provide opportunities to develop unique optical and chemical properties for sensing devices, as well as physicochemical interactive mechanisms between different molecules, atoms, and ions in energy storage devices.

Although several methods are available for nanostructured material fabrication, nanofabrication using high-powered, high-frequency laser pulses offers unique advantages over other approaches. It is a single-step approach that can be applied to a wide range of materials. With assistive gases and catalysts, it can also synthesize attractive nanomaterials, such as platelets, rods, and tips. These processes do not demand sophisticated equipment or long processing times and have all been demonstrated under industry-applicable conditions, including room temperature and atmospheric pressure.

This new mode of nanomaterial synthesis and a new form of nanomaterials and structures expands the scope of laser ablation in the synthesis of novel functional materials. It can create nanoalloys of otherwise immiscible metals and convert natural materials, such as rice husks and eggshells, into nanoceramics. Most solids can be converted into a nanoparticle network or “nanonetwork”, a free-standing, three-dimensional material made of smaller nanostructural units, with a very high surface area, offering great potential for energy storage devices and advanced nanosensing applications.



About Lecturer:

Dr. Amirkianoosh Kiani is currently an Associate Professor in the Department of Mechanical & Manufacturing Engineering, Ontario Tech University (Ontario, Canada). He obtained his Master of Science degree in Mechanical Engineering (Laser Material Processing) from the National Technical University of Ukraine “Kyiv Polytechnic Institute”, and his PhD in Mechanical Engineering (Laser Micro/Nano Fabrication) from Ryerson University (Ontario, Canada). Before joining the Ontario Tech University, Dr. Kiani worked as an Assistant Professor in the Department of Mechanical Engineering at the University of New Brunswick, Canada (2014-2017). During this period, he was actively involved in laser nanofabrication and nanomaterials research, as well as in the development and teaching of courses in mechanical engineering. Dr. Kiani joined the Ontario Tech University as an Assistant Professor in the Department of Mechanical and Manufacturing Engineering in 2017, where he established his current research, which is focused on advanced materials processing and micro/nano manufacturing.

Dr. Kiani's core research addresses challenges in the fundamental and applied research of pulsed laser materials processing in laser micro/nano manufacturing. Specializing in ultra-short laser materials processing and advanced materials, his work has applications in novel energy storage devices and advanced nanosensor fabrication.

Registration is required

<https://www.eventbrite.co.uk/e/ieee-nanotechnology-uk-ireland-chapter-seminar-by-amirkianoosh-kiani-tickets-527848287437>