



Spring 2023 Seminar Series
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**Transformation, reaction and organization of functional nanostructures using
microreactor-assisted nanomaterial deposition processes**

ABSTRACT:

The Microreactor-Assisted Nanomaterial Deposition (MAND) offers precise control over reaction, organization, and transformation processes to manufacture nanostructured materials with distinct morphologies, structures, and properties. In synthesis, microreactor technology offers large surface-area-to-volume ratios within microchannel structures to accelerate heat and mass transport. This accelerated transport allows for rapid changes in reaction temperatures and concentrations, leading to more uniform heating and mixing in the deposition process. The possibility of synthesizing nanomaterials in the required volumes at the point of application eliminates the need to store and transport potentially hazardous materials. Further, MAND provides new opportunities for tailoring novel nanostructures and nano-shaped features, opening the opportunity to assemble unique nanostructures and nanostructured thin films. I will discuss our recent advances in MAND-based synthesis, deposition and direct printing of nanomaterials via both solution and vapor phase routes and applying these reactive nanomaterials in-situ in additive manufacturing to manufacture various functional materials and devices.

BIOGRAPHY:

Dr. Chih-Hung Chang is currently a Professor and Associate Head of Undergraduate Programs at the School of Chemical, Biological, and Environmental Engineering, Oregon State University. Chih-hung's research focuses on studying solution-based thin film deposition processes, inkjet printing, microreaction technology, nanomaterials and more recently 3D printing; his group reported the first inkjet-printed amorphous oxide TFTs and CIGS solar cells. He also jointly invented Microreactor-Assisted Nanomaterial Deposition, a technique that the Society of Manufacturing Engineers recognized as the 2011 SME "Innovations That Could Change the Way You Manufacture" Watch List. Chih-hung was a SHARP Labs of America scholar, an Intel Faculty Fellow, and a recipient of AVS Graduate Research Award, National Science Foundation's CAREER award, and awardees of W.M. Keck Foundation and Walmart Manufacturing Innovation Foundation. Chih-hung is a Fellow of the National Academy of Inventors. He has more than 150 refereed publications and 15 issued patents. Chih-hung is a co-founder and director of Pellucere Technologies Inc. and an Editor of IEEE J. of Photovoltaics.