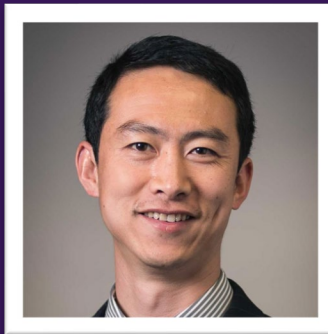


THE MATERIALS SCIENCE AND ENGINEERING DEPARTMENT
FALL COLLOQUIUM SERIES PRESENTS:

Professor Yanliang Zhang

Professor and Chair of Advance Materials and Manufacturing

Notre Dame University



Autonomous Multimaterial and Multiscale Additive Manufacturing for Sustainable Energy and Personalized Health

Additive manufacturing is evolving from shaping individual materials toward creating heterogeneous material systems with programmable compositions, structures, and properties across multiple length scales. In this talk, I will present our development of autonomous multimaterial and multiscale manufacturing approaches that integrate aerosol-based combinatorial printing, nanomaterial building blocks, multimodal processing and machine vision and machine learning enabled autonomy, to address grand challenges in sustainable energy and personalized and precision health.

Our high-throughput combinatorial printing platform dynamically mixes diverse aerosolized inks during deposition, enabling rapid exploration and fabrication of compositionally complex and functionally graded materials with microscale precision. For sustainable energy, we translate high-throughput materials discovery and scalable ink processing into high-performance thermoelectrics for energy harvesting and solid-state cooling. For personalized health, aerosol-based multimaterial printing enables three-dimensional gradient interfaces with submicron compositional control, bridging mechanically mismatched soft tissues and functional electronic materials to create highly stretchable, strain-insensitive bioelectronics. Extending these concepts to biomanufacturing and bioprinting, we integrate aerosol jet and extrusion printing with autonomous process optimization to fabricate hierarchical vascular networks with capillary-scale resolution. Together, these advances establish a transformative materials discovery and manufacturing paradigm to autonomously create functional materials and systems for a broad range of emerging technological applications.

Yanliang Zhang is Professor and Advanced Materials and Manufacturing Collegiate Chair at University of Notre Dame. He received his Ph.D. in Mechanical Engineering from Rensselaer Polytechnic Institute in 2011, and his M.S. and B.S. from Southeast University in 2008 and 2005. His research interests include multimaterials and multiscale additive manufacturing, autonomous materials discovery and manufacturing, bioprinting, sustainable energy and personalized health systems. He has received honors including NSF Career Award, Young Investigator Award from International Thermoelectric Society, IBM Fellowship award. Prof. Zhang has led multidisciplinary projects funded by DOE, NIH, NSF, ONR, and DARPA, and published papers in prestigious journals including *Nature*, *Nature Chemical Engineering*, *Advanced Materials*, *Energy & Environmental Science*, etc.

Tuesday, Oct. 13 • 4 pm CT • Tech L211

In person only; no Zoom

Questions? Contact allison.macknick@northwestern.edu