



Nanotechnology-Enabled Large-Scale Manufacturing of Metals for Complexity and Sustainability

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Abstract:

High performance metals offer tremendous potential to improve energy efficiency and system performance for numerous applications. However, conventional processing methods and systems in metals manufacturing have reached certain limits in further improving the properties and complexity

of metals with barriers in new metals processing. By incorporating nanoelements into functional materials, it becomes possible to attain extraordinary physical, chemical, and mechanical properties. This talk will present our scientific and technological progress on how nanotechnology can be applied to break metallurgical and manufacturing barriers. Through the nanotechnology-enabled process control techniques, we can achieve unprecedented control over micro/nano-structures and property tuning in large-scale metal manufacturing. Specifically, we will explore the application of nanotechnology in casting, welding, and Additive Manufacturing with powders and wires to produce complex metal parts. This nanotechnology-driven approach to metals manufacturing has opened up groundbreaking avenues for the industrial production of high-performance metal components and systems, addressing energy and sustainability challenges in today's society.

Bio:

Professor Xiaochun Li is the Raytheon Endowed Chair in Manufacturing Engineering in the Departments of Mechanical and Aerospace Engineering & Materials Science and Engineering at University of California, Los Angeles (UCLA). He is the pioneer and global leader in fundamental study, scalable manufacturing, successful commercialization and practical applications of nanotechnology enabled solidification processing. He currently serves as the Director of Smart Manufacturing Innovation Center at UCLA under the USA Clean Energy Smart Manufacturing Innovation Institute. He received his Ph.D. at Stanford University in 2001. He is a holder of multiple best paper awards and patents, including more than 10 of those licensed and commercialized by industry. Dr. Li received 2002 National Science Foundation CAREER award, 2003 Jiri Tlustý Outstanding Young Manufacturing Engineer Award from Society of Manufacturing Engineers, 2008 Howard F. Taylor Award from American Foundry Society (AFS), and 2022 ASME William T. Ennor Manufacturing Technology Award. Dr. Li was previously a professor in the Department of Mechanical Engineering and Materials Science Program at University of Wisconsin-Madison (UW-Madison) from 2001 to 2013. He served as the Director of Nano-Engineered Materials Processing Center (NEMPC) at UW-Madison between 2009 and 2013. Dr. Li has been elected Fellow of National Academy of Inventors in 2021. He is also a fellow in American Society of Mechanical Engineers and the International Society for Nanomanufacturing.

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