Light | Advanced Manufacturing

LAM Special Issue on

Atomic Scale Manufacturing for Optics and Photonics

Guest Editors:

Yuanliu Chen, Professor in Manufacturing, Zhejiang University, China

Xichun Luo, Professor in Ultra Precision Manufacturing, University of Strathclyde, UK

Hui Deng, Associate Professor in Manufacturing, Southern University of Science and Technology, China

Han Haitjema, Emeritus Professor in Metrology, KU Leuven, Belgium

Rong Su, Professor in Optical Metrology, Shanghai Institute of Optics and Fine Mechanics, China

Manufacturing has evolved from ancient craft-based techniques to modern precision-controlled processes, culminating in the ability to manipulate materials at the atomic scale, enabling the era of atomic and close-to-atomic scale manufacturing (ACSM). The emergence of ACSM is an inevitable outcome shaped by the three fundamental paradigms of manufacturing advancement, which includes all necessary steps to convert raw materials, components, or parts into products designed to meet the user's specifications. The processes involved in ACSM are not only atomically precise but also remove, add, or transform work material at the atomic and close-to-atomic scales to create new structures or systems with superior functions that cannot be achieved by traditional manufacturing technologies. This breakthrough allows for the precise control of individual atoms, facilitating the development of advanced technologies in various fields, such as quantum computing, molecular electronics, and biomedicine. ACSM offers new opportunities for producing defect-free materials and components at the atomic scale. However, the field still faces challenges in scaling up these processes to meet industrial demands (e.g. mass production) while maintaining atomic precision, which is crucial for widespread adoption in high-performance applications.

The aim of this special issue is to provide a platform for researchers and industry experts to present and review the latest advancements, address critical challenges, and offer forward-looking perspectives in ACSM for Optics and Photonics. Emphasizing both fundamental research and real-world applications, this special issue seeks contributions that explore novel approaches to manufacturing fundamentals, fabrication mechanisms, precision improvement, characterization and measurement techniques. Topics of interest include, but are not limited to, advances in atomic-scale machining, atomic layer deposition/etching, measurement and characterization at atomic-scale or with atomic-level precision, development of new components/systems based on atomic-scale principle, and their optics- and photonics-related applications in various fields. The goal is to highlight pioneering research that can shape the future of ACSM and promote its integration into industries demanding the next generation manufacturing technology.

Please contribute your submission via https://mc03.manuscriptcentral.com/lam and mark that it is a contribution to the Special Issue on Atomic Scale Manufacturing for Optics and Photonics in the cover letter upon submission.

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No. 3888 Dongnanhu Road, Changchun 130033, China

Tel:+86-431-86176851 E-mail: light_am@lightpublishing.cn