Editorial

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Biographical notes: Fengfeng (Jeff) Xi is a Professor and Ryerson Research Chair with the Department of Aerospace Engineering of Ryerson University. He obtained his PhD Degree from the University of Toronto and worked for the National Research Council Canada prior to joining Ryerson University. His research interests cover manufacturing, robotics and automation. In these areas, he has published over 130 journal and conference papers, also served as guest editors and editorial board members for a number of international journals.

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Bo Tan graduated with PhD in Mechanical Engineering from Nanyang Technological University, Singapore in 2002. She is currently working as an Assistant Professor at Department of Aerospace Engineering in Ryerson University, Canada. Before that, she worked as Research Engineer in Xsil Ltd., a European semiconductor manufacturer, for two years. Her research interests focus on short pulse laser ablation, laser micro manufacturing for semiconductor and microelectronics devices and laser applications in nanoscale manufacturing.

Aerospace engineering is probably the most fascinating branch of engineering because it studies and develops the things that fly through the air in the sky. Depending on the distance away from the earth, these flying things are classified into aircrafts inside earth's atmosphere, and space systems outside earth's atmosphere. Due to the stringent requirements on safety and reliability for use in space, aerospace engineering has always been at the frontier of developing advanced manufacturing technologies that are initially used for aircrafts and/or space systems and then gradually disseminated into other industries. Micro-manufacturing is one of the manufacturing technologies being actively

pursued in aerospace engineering. The purposes of this Special Issue are twofold, one being to provide a summary about the state of the art research and development work in this field, and the other being to stimulate further research along these directions.

In this Special Issue, there are in total six papers, with the first two papers covering the applications of micro manufacturing to aircrafts and the last four papers to space systems. One of the most important components in aircrafts is the engine. A great deal of efforts has been made to design and manufacture aircraft engines with the best performance and the longest life. The first paper, entitled 'An overview on micro-meso manufacturing techniques for micro-heat exchangers for turbine blade cooling', discussed the applicability of various micro-manufacturing technologies, including subtractive methods, additive methods and near net shaping methods, to mass production of micro-heat exchangers. Embedded in the turbine blades of the aircraft engine, these micro-heat exchangers are used for fast heat dissipation in order to further improve engine's reliability and life. The second paper, entitled 'Micro-EDM process investigation of Si_3N_4–TiN ceramic composites for the development of micro-fuel-based power units', investigated the feasibility of using the micro Electrical Discharge Machining (EDM) method for manufacturing miniature gas-turbine impellers made of very hard Ceramic Matrix Composites (CMC). Micro-EDM is one of the feasible subtractive micro-manufacturing methods identified in the first paper for mass production of micro-heat exchangers.

One of the active research areas in space systems is the development of miniaturised spacecrafts and satellites. The third paper, entitled 'A design and development of Pico- and Femto-satellites', described the trend in miniaturising satellites going from standard weight (>500 Kg), mini weight (100~500 Kg), micro weight (10–100 Kg), nano weight (1~10 Kg), to pico (0.1~1 Kg) and femto weight (<0.1 Kg), leading to what is called 'Spacecraft-on-a-chip', for cost reduction and application expansion in space. The fourth paper, entitled 'Design considerations for supersonic micronozzles', discussed the design of miniaturised propulsion systems used to power nano-satellites and identified the supersonic nozzle as a key component in this design. The fifth paper, entitled 'MaTT, an automatic toolpath generator for laser-patterning high-aspect-ratio microstructures in photosensitive materials', developed an enabling technology for mass production of glass-ceramic made nano-satellites using laser direct-write microfabrication method. The last paper, entitled 'Applying manufacturing procedures to improve Loop Heat Pipes performance', presented a new design of Loop Heat Pipes (LHP) for fast heat dissipation in spacecrafts. The author of the last paper introduced microgrooves to the new LHP as well as the pertaining manufacturing method so that less hazardous fluids can be used in LHP without degrading the heat dissipation efficiency.

Although by no means the six papers in this Special Issue will give a complete summary of research around the world on aerospace micro-manufacturing, it is our humble hope, as the Guest Editors, that these papers would shed some lights on the reseach in this field. Finally, we like to take this opportunity to thank Dr. Lihui Wang, the Editor-in-Chief of the Journal, for his encouragement and support to this Special Issue, and we also wish to gratefully acknowledge all referees who have generously given their time to review the papers submitted to this Special Issue.