Foreword to the Special Issue on Micro- and Nano-Metrology in Japan (I)

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Micro- and nano-metrology occupies an important position in modern production engineering where higher-precision machining is required. A visualization of the process is indispensable for the creation of new technologies in state-of-the-art manufacturing that deals with the geometrical quantity in micrometers/nanometers. Precision micro- and nano-metrology is thus becoming more and more important as the platform of various manufacturing technologies, as well as strategic tools for responding to rapidly changing fabrication techniques in many scientific and industrial fields.

In Japan, the subcommittee entitled “Intelligent Nano-Measure” was established in 2004 by pioneers in the Japan Society for Precision Engineering (JSPE). Following this subcommittee, the Technical Committee (TC) of Intelligent Nano-Measure was established in 2006. This TC explores a wide range of measurement technologies in manufacturing including basic research that pursues the continuous evolution of measurement standards, as well as the applied research for the development of new measurement technologies applicable to new manufacturing technologies. Major academic researchers and engineers related to micro- and nano-metrology and manufacturing in Japan are participating in the TC, and are actively engaged in activities. This special issue was compiled by three young researchers

belonging to this TC; Dr. Yuki Shimizu of Tohoku University, Dr. Yasuhiro Mizutani of Osaka University, and Dr. Masaki Michihata of the University of Tokyo as guest editors. In addition, this special issue also contains a large number of papers submitted by young researchers who belong to the TC of Intelligent Nano-Measure.

A series of papers in the special issue is published in *Nanomanufacturing and Metrology* in two issues. The first issue includes four original research papers treating in-process diameter measurement of a micro-optical fiber on the basis of standing wave illumination, ghost imaging for position mapping of a weakly scattered light source with the enhancement of the technique of deep learning, the evaluation of internal residual stress in plastic parts based on terahertz spectroscopy, and design and development of a three-axis miniature stage with closed-loop control and reduced motion errors. One review article treating laser interference lithography for the fabrication of two-dimensional grating pattern structures for optical micro- and nano-metrology is also included in the first issue.

The guest editors would like to take this opportunity to thank all the contributing authors for their great efforts in presenting their excellent research work for the special issue. Our appreciation also goes to all the experts in the Technical Committee of Intelligent Nano-Measure in JSPE who have provided invaluable comments and suggestions for the further improvement of the quality of the research papers. The guest editors would also like to thank Professor Wei Gao (Tohoku University, Japan) for the tremendous support in the preparation of this special issue. Kind support from the editorial staff of *Nanomanufacturing and Metrology* is also appreciated.

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Yuki Shimizu received his MS in precision engineering from Tohoku University, Japan, in 2002. He had spent his career at Hitachi Ltd. from 2002 to 2011 and had been involved in the research on head-disk interface technology for a hard disk drive. He received his PhD in Mechanical Engineering from Nagoya University, Japan, in 2009. He has been an associate professor in the Department of Finemechanics, Tohoku University, Japan, since 2011. He has published more than 150 journal

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