

Preface

“When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the state of science.” - Lord Kelvin.

Measurement, which is for ascertaining the size, amount or degree of a measurand by an instrument through comparison with a standard unit, or indirectly by calculation based on theory, makes science and technology different from imagination. Measurement is also essential in industry, commerce and daily life. If we focus on the manufacturing industry, we can easily find that measurement and instrumentation technology is playing an increasingly important role in not only the traditional field of manufacturing but also the new field of micro/nano technology and bioengineering.

Following the last seven publications in 1989, 1993, 1996, 1998, 2001, 2003, and 2005 in the series of “Measurement Technology and Intelligent Instruments”, this book presents advances of measurement and instrumentation for manufacturing industry. A wide range of topics are covered in this book, including micro/nano-metrology, precision measurement, online & in-process measurement, surface metrology, optical metrology & image processing, biomeasurement, sensor technology, intelligent measurement & instrumentation, uncertainty, traceability & calibration, and signal processing algorithm.

163 papers are included in this book. The papers are contributed from countries and regions from the world, including Australia, Austria, China, Croatia, Egypt, France, Germany, Hong Kong, Hungary, Japan, Mexico, Poland, Republic of Korea, Russia, Singapore, Spain, Taiwan, Turkey, UK, USA, and Viet Nam. Each of the papers in full length version was reviewed from its originality and quality by multiple experts among the List of Reviewers. The acceptance of paper for inclusion in this book was based on the recommendations from the reviewers. We believe that this book presents the newest information on measurement technology and intelligent instruments from basic researches to applied systems for manufacturing industry.

I would like to thank all the authors for their great contributions to this book and all the reviewers for their careful reviews of the papers. The dedicated efforts in the editorial work made by my co-editors, Professor Y. Takaya, Professor Y. Gao and Dr. M. Krystek are highly appreciated. I would also like to thank my Ph. D students, Mr. A. Shibuya, Mr. S. Y. Dian and Mr. Y. J. Noh for their invaluable assistance in the editorial work.

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