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Nanoelectronics is changing the way the world communicates, and is transforming our daily lives. Continuing Moore's law and miniaturization of low-power semiconductor chips with ever-increasing functionality have been relentlessly driving R&D of new devices, materials, and process capabilities to meet performance, power, and cost requirements. This book covers up-to-date advances in research and industry practices in nanometrology, critical for continuing technology scaling and product innovation. It holistically approaches the subject matter and addresses emerging and important topics in semiconductor R&D and manufacturing. It is a complete guide for metrology and diagnostic techniques essential for process technology, electronics packaging, and product development and debugging—a unique approach compared to other books. The authors are from academia, government labs, and industry and have vast experience and expertise in the topics presented. The book is intended for all those involved in IC manufacturing and nanoelectronics and for those studying nanoelectronics process and assembly technologies or working in device testing, characterization, and diagnostic techniques.

Zhiyong Ma received his MS degree in materials engineering from Purdue University, Indiana, and a PhD in materials science and engineering from the University of Illinois, Urbana-Champaign. He worked in thin-film metallization and processing at Digital Equipment Corporation and joined Intel's Corporate Quality Network in 1995. Currently, he is vice president of the Technology and Manufacturing Group and director of Technology Development and Manufacturing Labs at Intel, responsible for the CQN lab network in support of silicon and assembly technology development and manufacturing, product fault diagnostics, and silicon and platform benchmarking, including strategic business planning, analytical technique development, and metrology roadmaps. Dr. Ma holds 8 patents in underbump metallization, strained silicon transistors, secured fuse technology, and silicon diagnostic techniques, has published more than 25 refereed papers, and has coauthored a book chapter on silicide technology. His research interests include thin-film kinetics, analytical techniques and metrology, and product fault diagnostics.

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