



Micro- and Nano-Scale Sensors and Transducers

By Ezzat G. Bakhoun

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The rapidly emerging fields of nanotechnology and nano-fabrication have enabled the creation of new sensors with dramatic improvements in sensitivity and range, along with substantial miniaturization. And, although there are many books on nanotechnology, recent advances in micro and nano-scale sensors and transducers are not adequately represented in most books. This book fills that gap.

Micro- and Nano-Scale Sensors and Transducers provides a summary of the state of the art in sensor and transducer technology. Teaching you how to make more informed selections of sensors or transducers for particular applications, it describes the differences between new sensor and transducer technologies based on nanotechnology and nano-fabrication and the older or "classical" sensor technologies.

The book presents the new structures of pressure sensors being used in such applications as mechanical pressure sensing, gas pressure sensing, and atmospheric pressure sensing. It illustrates the novel structures and characteristics of new motion and acceleration sensors.

Describing highly sensitive miniature gas and smoke sensors based on nano-structured electrodes, the book presents novel techniques for detecting atmospheric moisture and moisture inside small electronic components. It also covers applications of optoelectronic and photonic sensors.

The book examines multi-purpose biological and chemical analysis devices where each device is fully contained in one integrated circuit (Lab on a Chip) as well as other advanced chemical and biological sensors. It describes electric, magnetic, and RF / microwave sensors and their applications and also considers integrated sensor / actuator units and special-purpose sensors.

Each chapter in the book includes a set of quizzes / short questions, along with answers.

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Editorial Review

Review

"This book provides technical details on some of the most recent sensor types that use micro- to nano-scale fabrication. This is one of the best books I have recently read on sensors. It presents a clear and concise summary of the state of the art of sensor and transducer technology as of 2014. The book describes different sensors based on novel ideas at or near commercial readiness. These sensors are compared with conventional sensor technology to illustrate the advantages of the new designs. ... The direct straightforward listing of cutting-edge sensors, at or near commercialization, with their corresponding applications, makes this an outstanding book for anyone who designs or specifies sensors."

?John J. Shea, *IEEE Electrical Insulation Magazine*, January/February - Vol. 32, No. 1

About the Author

Ezzat G. Bakhoum received a B.S. degree from Ain Shams University, Cairo, Egypt, in 1986; M.S. and Ph.D. degrees from Duke University, Durham, NC, USA, in 1989 and 1994, respectively, all in electrical engineering. From 1994 to 1996, he served as a Senior Engineer and Managing Partner at ESD Research, Inc., Research Triangle Park, North Carolina. From 1996 to 2000, he worked as a Senior Engineer at Lockheed Martin/L3 Communications, Inc., Camden, New Jersey. From 2000 to 2005, Dr. Bakhoum served as a Lecturer in the Electrical Engineering Department at the New Jersey Institute of Technology, Newark, New Jersey. Dr. Bakhoum is currently an Associate Professor at the University of West Florida.

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