



# Physics, Chemistry and Technology of Solid State Gas Sensor Devices

By Andreas Mandelis, Constantinos Christofides

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**Physics, Chemistry and Technology of Solid State Gas Sensor Devices** By  
Andreas Mandelis, Constantinos Christofides

Research and development of solid state gas sensor devices began in the 1950s with several uncoordinated independent efforts. The number and pace of these investigations later accelerated in response to increasing pressure placed on the environment and public health by industrial activities. Since 1970, several thousand articles have been written on the subject, and laboratories around the globe have introduced novel methodologies and devices to address needs associated with particular technological developments. Despite the rapid development of this important new technology, very little has been done to review and coordinate data related to sensor science and technology itself.

*Physics, Chemistry and Technology of Solid State Gas Sensor Devices* focuses on the underlying principles of solid state sensor operation and reveals the rich fabric of interdisciplinary science that governs modern sensing devices. Beginning with some historical and scientific background, the text proceeds to a study of the interactions of gases with surfaces. Subsequent chapters present detailed information on the fabrication, performance, and application of a variety of sensors.

Types of sensor devices discussed include:

- Gas-sensitive solid state semiconductor sensors
- Photonic and photoacoustic gas sensors
- Fiber optic sensors
- Piezoelectric quartz crystal microbalance sensors
- Surface acoustic wave sensors
- Pyroelectric and thermal sensors

For analytical chemists using solid state sensors in environment-related analysis, and for electrical engineers working with solid state sensors, this book will expand and unify their understanding of these devices, both in theory and practice.

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About the Author

**ANDREAS MANDELIS** is Director of the Photothermal and Optoelectronic Diagnostics Laboratory at the University of Toronto and Professor of Mechanical and Electrical Engineering. His current research interests include areas of solid-state thermal-wave gas sensors, novel photothermal instrumentation and techniques, the physics of thermal waves and tomographic developments, deep level electronic defects and the study of nonradiative quantum efficiencies in solid-state laser materials. He is the author of more than 100 published papers and the editor of a number of well-received books on photothermal and photoacoustic science and technology. He is on the Executive Committee of the Instrumentation and Measurement Science Topical Group of the American Physical Society and a member of the Center for Hydrogen and Electrochemical Studies of the University of Toronto. Dr. Mandelis holds a BS in physics from Yale University and advanced degrees in applied physics and material science from Princeton University.

**CONSTANTINOS CHRISTOFIDES** is Assistant Professor in the Department of Natural Sciences at the University of Cyprus, in Nicosia. His major interests include the development of new devices, applied optics, advanced materials, and solar energy. He is a member of the American Physical Society, the Canadian Association of Physicists, the Spectroscopic Society of Canada, and the International Solar Energy Society. Dr. Christofides holds advanced degrees in physics, applied physics and energy physics from Grenoble University, in France. In addition, he was a postdoctoral fellow at Sherbrooke University, and a research associate and lecturer with the Photothermal and Optoelectronic Diagnostics Laboratory at the University of Toronto.

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