



Integrated Chemical Microsensor Systems in CMOS Technology (Microtechnology and MEMS)

Andreas Hierlemann

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This book, 'Integrated Chemical Microsensor Systems in CMOS Technology', provides a comprehensive treatment of the highly interdisciplinary field of CMOS chemical microsensor systems. It is targeted at students, scientists and engineers who are interested in gaining an introduction to the field of chemical sensing since all the necessary fundamental knowledge is included. However, as it provides detailed information on all important issues related to the realization of chemical microsensors in CMOS technology, it also addresses experts well familiar with the field. After a brief introduction, the fundamentals of chemical sensing are presented. Fabrication and processing steps that are commonly used in the semiconductor industry are then detailed followed by a short description of the microfabrication techniques, and of the CMOS substrate and materials. Thereafter, a comprehensive overview of semiconductor-based and CMOS-based transducer structures for chemical sensors is given. CMOS-technology is then introduced as platform technology, which enables the integration of these microtransducers with the necessary driving and signal conditioning circuitry on the same chip. In a next section, the development of monolithic multisensor arrays and fully developed microsystems with on-chip sensor control and standard interfaces is described. A short section on packaging shows that techniques from the semiconductor industry can be applied to chemical microsensor packaging. The book concludes with a brief outlook on future developments, such as the realization of more complex integrated microsensor systems and methods to interface biological materials, such as cells, with CMOS microelectronics.

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