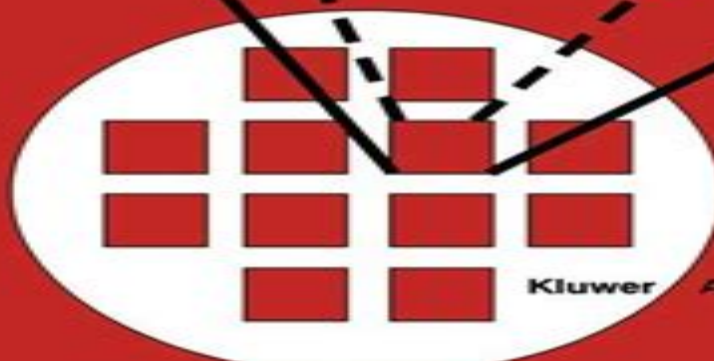


Mark R. Hornung and Oliver Brand

**MICROMACHINED
ULTRASOUND-BASED
PROXIMITY
SENSORS**



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Micromachined Ultrasound Based Proximity Sensors Microsystems

**Hyongsok T. Soh, Kathryn Wilder
Guarini, Calvin F. Quate**



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and Applications of NanoMEMS Physics Hector Santos, 2006-07-02 Principles and Applications of NanoMEMS Physics presents the first unified exposition of the physical principles at the heart of NanoMEMS based devices and applications. In particular, after beginning with a comprehensive presentation of the fundamentals and limitations of nanotechnology and MEMS fabrication techniques, the book addresses the physics germane to this dimensional regime, namely quantum wave particle phenomena including the manifestation of charge discreteness, quantized electrostatic actuation and the Casimir effect, and quantum wave phenomena including quantized electrical conductance, quantum interference, Luttinger liquids, quantum entanglement, superconductivity, and cavity quantum electrodynamics. Potential building blocks are also addressed for NanoMEMS applications, including nanoelectromechanical quantum circuits and systems such as charge detectors, the which-path electron interferometer, and the Casimir oscillator, as well as a number of quantum computing implementation paradigms. Finally, NanoMEMS applications in photonics are addressed, including nanophotonic light sources and plasmonic devices.

Micromachined Mirrors Robert Conant, 2013-04-17 Micromachined Mirrors provides an overview of the performance enhancements that will be realized by miniaturizing scanning mirrors like those used for laser printers and barcode scanners, and the newly enabled applications including raster scanning projection video displays and compact high speed fiber optic components. There are a wide variety of methods used to fabricate micromachined mirrors, each with its advantages and disadvantages. There are, however, performance criteria common to mirrors made from any of these fabrication processes. For example, optical resolution is related to the mirror aperture, the mirror flatness, and the scan angle. Micromachined Mirrors provides a framework for the design of micromirrors and derives equations showing the fundamental limits for micromirror performance. These limits provide the micromirror designer with tools with which to determine the acceptable mirror geometries and to quickly and easily determine the range of possible mirror optical resolution and scan speed.

Microtransducer CAD Arokia Nathan, Henry Baltes, 2012-12-06 Computer aided design CAD of semiconductor microtransducers is relatively new in contrast to their counterparts in the integrated circuit world. Integrated silicon microtransducers are realized using microfabrication techniques similar to those for standard integrated circuits (ICs). Unlike IC devices, however, microtransducers must interact with their environment, so their numerical simulation is considerably more complex. While the design of ICs aims at suppressing parasitic effects, microtransducers thrive on optimizing the one or the other such effect. The challenging quest for physical models and simulation tools enabling microtransducer CAD is the topic of this book. The book is intended as a text for graduate students in Electrical Engineering and Physics, and as a reference for CAD engineers in the microsystems industry.

Microfabrication in Tissue Engineering and Bioartificial Organs Sangeeta N. Bhatia, 2012-12-06 The Microsystems Series has as its goal the creation of an outstanding set of textbooks, references, and monographs on subjects that span the broad field of microsystems. Exceptional PhD dissertations provide a good starting point for such a series because, unlike monographs by more senior authors, which must compete with

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Microfabrication in Tissue Engineering and Bioartificial Organs Foreword One of the emerging applications of microsystems technology in biology and medicine is in the field of tissue engineering and artificial organs In order to function cells need to receive proper signals from their environment

Scanning Probe Lithography Hyongsok T. Soh, Kathryn Wilder Guarini, Calvin F. Quate, 2013-03-14 Scanning Probe Lithography SPL describes recent advances in the field of scanning probe lithography a high resolution patterning technique that uses a sharp tip in close proximity to a sample to pattern nanometer scale features on the sample SPL is capable of patterning sub 30nm features with nanometer scale alignment registration It is a relatively simple inexpensive reliable method for patterning nanometer scale features on various substrates It has potential applications for nanometer scale research for maskless semiconductor lithography and for photomask patterning The authors of this book have been key players in this exciting new field Calvin Quate has been involved since the beginning in the early 1980s and leads the research team that is regarded as the foremost group in this field Hyongsok Tom Soh and Kathryn Wilder Guarini have been the members of this group who in the last few years have brought about remarkable series of advances in SPM lithography Some of these advances have been in the control of the tip which has allowed the scanning speed to be increased from μm second to mm second Both non contact and in contact writing have been demonstrated as has controlled writing of sub 100 nm lines over large steps on the substrate surface The engineering of a custom designed MOSFET built into each microcantilever for individual current control is another notable achievement Micromachined arrays of probes each with individual control have been demonstrated One of the most intriguing new aspects is the use of directly grown carbon nanotubes as robust high resolution emitters In this book the authors concisely and authoritatively describe the historical context the relevant inventions and the prospects for eventual manufacturing use of this exciting new technology

Microfluidics and BioMEMS Applications Francis E. H. Tay, 2013-04-17 Microfluidics and BioMEMS Applications central idea is on microfluidics a relatively new research field which finds its niche in biomedical devices especially on lab on a chip and related products Being the essential component in providing driving fluidic flows an example of micropump is chosen to illustrate a complete cycle in development of

microfluidic devices which include literature review designing and modelling fabrication and testing A few articles are included to demonstrate the idea of tackling this research problem and they cover the main development scope discussed earlier as well as other advanced modelling schemes for microfluidics and beyond Scientists and students working in the areas of MEMS and microfluidics will benefit from this book which may serve both communities as both a reference monograph and a textbook for courses in numerical simulation and design and development of microfluidic devices

Microscale Heat Conduction in Integrated Circuits and Their Constituent Films Y. Sungtaek Ju, Kenneth E.

Goodson, 2012-12-06 The study of thermal phenomena in microdevices has attracted significant attention recently The interdisciplinary nature of this topic however makes it very difficult for researchers to fully understand details of research results presented in journal articles For many researchers intending to be active in this field therefore a more comprehensive treatment complete with sufficient background information is urgently needed Advances in semiconductor device technology render the thermal characterization and design of ICs increasingly more important The present book discusses experimental and theoretical studies of heat transfer in transistors and interconnects A novel optical thermometry technique captures temperature fields with high temporal and spatial resolutions in devices that are subjected to electrical overstress EOS and electrostatic discharge ESD Also reported are techniques for determining the thermal transport properties of dielectric passivation layers and ultra thin silicon on insulator SOI layers Theoretical analysis on the data yields insight into the dependence of thermal properties on film processing conditions The techniques and data presented here will greatly aid the thermal engineering of interconnects and transistors

Optical Microscanners and Microspectrometers using Thermal Bimorph Actuators Gerhard Lammel, Sandra Schweizer, Philippe Renaud, 2013-03-09 Optical Microscanners and Microspectrometers using Thermal Bimorph Actuators shows how to design and fabricate optical microsystems using innovative technologies and original architectures A barcode scanner laser projection mirror and a microspectrometer are explained in detail starting from the system conception discussing simulations choice of cleanroom technologies design fabrication device test packaging all the way to the system assembly An advanced microscanning device capable of one and two dimensional scanning can be integrated in a compact barcode scanning system composed of a laser diode and adapted optics The original design of the microscanner combines efficiently the miniaturized thermal mechanical actuator and the reflecting mirror providing a one dimensional scanning or a unique combination of two movements depending on the geometry The simplicity of the device makes it a competitive component The authors rethink the design of a miniaturized optical device and find a compact solution for a microspectrometer based on a tunable filter and a single pixel detector A porous silicon technology combines efficiently the optical filter function with a thermal mechanical actuator on chip The methodology for design and process calibration are discussed in detail The device is the core component of an infrared gas spectrometer

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