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Ultrasonic transducers reviews recent research in the design and application of this important technology. Part one provides an overview of materials and design of ultrasonic transducers. Piezoelectricity and basic configurations are explored in depth, along with electromagnetic acoustic transducers, and the use of ceramics, thin film and single crystals in ultrasonic transducers.

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Ultrasonic transducers are key components in sensors for distance, flow and level measurement as ...

Ultrasonic Transducers: Materials and Design for Sensors ...

Ultrasonic transducers are key components in sensors for distance, flow and level measurement as well as power and other applications of ultrasound. This book reviews recent research in the design and application of this important technology. Part one provides an overview of materials and design of ultrasonic transducers.

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Ultrasonic transducers : materials and design for sensors, actuators and medical applications / K. Nakamura. Published: Cambridge, UK ; Philadelphia : Woodhead Publishing, 2012. Physical Description: xxv, 722 pages : illustrations ; 24 cm. Additional Creators: Nakamura, K.

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Ultrasonic Transducers Materials And Design For Sensors ...

Contributor contact details Woodhead Publishing Series in Electronic and Optical Materials Preface Part I: Materials and design of ultrasonic transducers Chapter 1: Piezoelectricity and basic

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configurations for piezoelectric ultrasonic transducers Abstract: 1.1 Introduction 1.2 The piezoelectric effect 1.3 Piezoelectric materials 1.4 ...

Ultrasonic transducers : materials and design for sensors ...

Ultrasonic transducers are key components in sensors for distance, flow and level measurement as well as in power, biomedical and other applications of ultrasound. Ultrasonic transducers reviews recent research in the design and application of this important technology. Part one provides an overview of materials and design of ultrasonic transducers.

Ultrasonic Transducers | ScienceDirect

Ultrasonic transducers reviews recent research in the design and application of this important technology. Part one provides an overview of materials and design of ultrasonic transducers. Piezoelectricity and basic configurations are explored in depth, along with electromagnetic acoustic transducers, and the use of ceramics, thin film and single crystals in ultrasonic transducers.

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In this paper, we present an analytic model for thickness resonating plate ultrasound energy receivers, which we have derived from the piezoelectric and the wave equations and, in

Analytic model for ultrasound energy receivers and their ...

It also discusses the materials and designs of power ultrasonic transducers and devices. Part two looks at applications of high power ultrasound in materials engineering and mechanical engineering, food

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Power Ultrasonics: Applications of High-Intensity ...

The first one was a conventional single-piezoelectric-layer transducer made of PMN-29PT single crystal called transducer #1; Then PMN-29PT single crystals and PZT-5H ceramics were separately used as the two-layered materials of the transducers, which were called transducer #2 and transducer #3, respectively.

Optimizing dual-piezoelectric-layer ultrasonic transducer ...

Ultrasonic transducers reviews recent research in the design and application of this important technology. Part one provides an overview of materials and design of ultrasonic transducers. Piezoelectricity and basic configurations are explored in depth, along with electromagnetic acoustic transducers, and the use of ceramics, thin film and single crystals in ultrasonic transducers.

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Part one provides an overview of materials and design of ultrasonic transducers. Piezoelectricity and basic configurations are explored in depth, along with electromagnetic acoustic transducers, and the use of ceramics, thin film and single crystals in ultrasonic transducers.

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Firstly, the basic principles of piezoelectric materials and design considerations for ultrasound transducers will be introduced. Following the review, the current status of the piezoelectric films and recent progress in the development of high frequency ultrasonic transducers will be discussed.

Ultrasonic transducers are key components in sensors for distance, flow and level measurement as well as in power, biomedical and other applications of ultrasound. Ultrasonic transducers reviews recent research in the design and application of this important technology. Part one provides an overview of materials and design of ultrasonic transducers. Piezoelectricity and basic configurations are explored in depth, along with electromagnetic acoustic transducers, and the use of ceramics, thin film and single crystals in ultrasonic transducers. Part two goes on to investigate modelling and characterisation, with performance modelling, electrical evaluation, laser Doppler vibrometry and optical visualisation all considered in detail. Applications of ultrasonic transducers are the focus of part three, beginning with a review of surface acoustic wave devices and air-borne ultrasound transducers, and going on to consider ultrasonic transducers for use at high temperature and in flaw detection systems, power, biomedical and micro-scale ultrasonics, therapeutic ultrasound devices, piezoelectric and fibre optic hydrophones, and ultrasonic motors are also described. With its distinguished editor and expert team of international contributors, Ultrasonic transducers is an authoritative review of key developments for engineers and

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materials scientists involved in this area of technology as well as in its applications in sectors as diverse as electronics, wireless communication and medical diagnostics. Reviews recent research in the design and application of ultrasonic transducers Provides an overview of the materials and design of ultrasonic transducers, with an in-depth exploration of piezoelectricity and basic configurations Investigates modelling and characterisation, applications of ultrasonic transducers, and ultrasonic transducers for use at high temperature and in flaw detection systems

The industrial interest in ultrasonic processing has revived during recent years because ultrasonic technology may represent a flexible “ green alternative for more energy efficient processes. A challenge in the application of high-intensity ultrasound to industrial processing is the design and development of specific power ultrasonic systems for large scale operation. In the area of ultrasonic processing in fluid and multiphase media the development of a new family of power generators with extensive radiating surfaces has significantly contributed to the implementation at industrial scale of several applications in sectors such as the food industry, environment, and manufacturing. Part one covers fundamentals of nonlinear propagation of ultrasonic waves in fluids and solids. It also discusses the materials and designs of power ultrasonic transducers and devices. Part two looks at applications of high power ultrasound in materials engineering and mechanical engineering, food processing technology, environmental monitoring and remediation and industrial and chemical processing (including pharmaceuticals), medicine and biotechnology. Covers the fundamentals of nonlinear propagation of ultrasonic waves in fluids and solids. Discusses the materials and designs of power ultrasonic transducers and devices. Considers state-of-the-art power sonic applications across a wide range of industries.

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The book discusses the underlying physical principles of piezoelectric materials, important properties of ferroelectric/piezoelectric materials used in today ' s transducer technology, and the principles used in transducer design. It provides examples of a wide range of applications of such materials along with the appertaining rationales. With contributions from distinguished researchers, this is a comprehensive reference on all the pertinent aspects of piezoelectric materials.

The fabrication of MEMS has been predominately achieved by etching the polysilicon material. However, new materials are in large demands that could overcome the hurdles in fabrication or manufacturing process. Although, an enormous amount of work being accomplished in the area, most of the information is treated as confidential or privileged. It is extremely hard to find the meaningful information for the new or related developments. This book is collection of chapters written by experts in MEMS and NEMS technology. Chapters are contributed on the development of new MEMS and NEMS materials as well as on the properties of these devices. Important properties such as residual stresses and buckling behavior in the devices are discussed as separate chapters. Various models have been included in the chapters that studies the mode and mechanism of failure of the MEMS and NEMS. This book is meant for the graduate students, research scholars and engineers who are involved in the research and developments of advanced MEMS and NEMS for a wide variety of applications. Critical information has been included for the readers that will help them in gaining precise control over dimensional stability, quality, reliability, productivity and maintenance in MEMS and NEMS. No such book is available in the market that addresses the developments and failures in these advanced devices.

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In recent years remarkable progress has been made in the development of materials for ultrasonic transducers. There is a continuing trend towards increasingly higher frequency ranges for the application of ultrasonic transducers in modern technology. The progress in this area has been especially rapid and articles and papers on the subject are scattered over numerous technical and scientific journals in this country and abroad. Although good books have appeared on ultrasonics in general and ultrasonic transducers in particular in which, for obvious reasons, materials play an important part, no comprehensive treatise is available that represents the state-of-the-art on modern ultrasonic transducer materials. This book intends to fill a need for a thorough review of the subject. Not all materials are covered of which, theoretically, ultrasonic transducers could be made but those that are or may be of technical importance and which have inherent electroacoustic transducer properties, i.e., materials that are either magnetostrictive, electrostrictive, or piezoelectric. The book has been divided into three parts which somewhat reflect the historic development of ultrasonic transducer materials for important technical application. Chapter 1 deals with magnetostrictive materials, magnetostrictive metals and their alloys, and magnetostrictive ferrites (polycrystalline ceramics). The metals are useful especially in cases where ruggedness of the transducers are of overriding importance and in the lower ultrasonic frequency range.

The objective of this research is to enable deployment of Ultrasonic Thermometers (UTs) in irradiations of ceramic and metallic fuels. Research was broken into two main areas; out-of-core development and

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testing of the UT and its components in a laboratory environment and in-core assessment of the radiation tolerance of the magnetostrictive transducers used to generate and sense the acoustic signals. Significant progress was made toward the deployment of UTs. Appropriate sensor materials were identified. For applications below 1000 ° C stainless steel was identified. For temperatures between 1000 and 2500 ° C, a variety of molybdenum doped with tungsten and potassium silicate was selected. A new, high frequency coil was developed and used to improve spatial resolution of reflectors by allowing minimization of reflector spacing. This effect is enhanced by the use of a new method of damping developed to remove “ back end ” reflections, eliminating interference caused by them and simplifying signal processing. A signal processing method was also identified and tested, which changed the difficult identification of Gaussian sinusoids into simple peak detection. An irradiation test capsule design was developed that includes both piezoelectric and magnetostrictive materials, transducers, and sensors. It is the first to include both piezoelectric and magnetostrictive materials, and is scheduled to surpass other ultrasonic transducer irradiations in terms of total fluence. As part of this research, a new design of magnetostrictive transducers was developed, fabricated, evaluated in a laboratory setting, and included in this irradiation test. The irradiation test was initiated to identify transducer materials that can survive in a high radiation environment. The included transducers were operated online during irradiation; and the test capsule was heavily instrumented with real time sensors, resulting in a high degree of confidence in the results. The results shows ultrasonic transducers based on magnetostrictive materials, such as Remendur and Galfenol, to be highly resistant to degradation caused by neutron and gamma radiation.

This two volume set reviews the key issues in processing and characterization of nanoscale ferroelectrics

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and multiferroics, and provides a comprehensive description of their properties, with an emphasis in differentiating size effects of extrinsic ones like boundary or interface effects. Recently described nanoscale novel phenomena are also addressed. Organized into three parts it addresses key issues in processing (nanostructuring), characterization (of the nanostructured materials) and nanoscale effects. Taking full advantage of the synergies between nanoscale ferroelectrics and multiferroics, the text covers materials nanostructured at all levels, from ceramic technologies like ferroelectric nanopowders, bulk nanostructured ceramics and thick films, and magnetoelectric nanocomposites, to thin films, either polycrystalline layer heterostructures or epitaxial systems, and to nanoscale free standing objects with specific geometries, such as nanowires and tubes at different levels of development. This set is developed from the high level European scientific knowledge platform built within the COST (European Cooperation in Science and Technology) Action on Single and multiphase ferroics and multiferroics with restricted geometries (SIMUFER, ref. MP0904). Chapter contributors have been carefully selected, and have all made major contributions to knowledge of the respective topics, and overall, they are among most respected scientists in the field.

Engineers, scientists, and technologists will find here, for the first time, a clear and comprehensive account of applications of ultrasonics in the field of process control. Using numerous examples of high-volume, low-cost applications, the author illustrates how the use of new transducer materials and designs, combined with microprocessor-based electronics, make technical and financial sense for concepts that only a few years ago might have been of interest only to academicians. Some of the important topics covered include coupling, acoustic isolation, transducer and sensor design, and signal detection in the presence of noise.

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