

1. Record Nr.	UNINA9910830933003321
Autore	Bain Ashim Kumar
Titolo	Pyroelectric materials : physics and applications // Ashim Kumar Bain, Prem Chand
Pubbl/distr/stampa	Weinheim, Germany : , : Wiley-VCH, , [2023] ©2023
ISBN	3-527-83974-7 3-527-83972-0
Descrizione fisica	1 online resource (257 pages)
Disciplina	537.2446
Soggetti	Piezoelectric materials
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Includes index.
Nota di contenuto	Cover -- Title Page -- Copyright -- Contents -- Preface -- Chapter 1 Fundamentals of Dielectrics -- 1.1 Dielectrics -- 1.1.1 Polarization of Dielectrics -- 1.1.2 Dispersion of Dielectric Polarization -- 1.1.2.1 Electronic Polarization -- 1.1.2.2 Ionic Polarization -- 1.1.2.3 Orientation Polarization -- 1.1.2.4 Space Charge Polarization -- 1.1.3 Dielectric Relaxation -- 1.1.4 Debye Relaxation -- 1.1.5 Molecular Theory of Induced Charges in a Dielectric -- 1.1.6 Capacitance of a Parallel Plate Capacitor -- 1.1.7 Electric Displacement Field, Dielectric Constant, and Electric Susceptibility -- 1.1.8 Local Field in a Dielectric -- 1.1.8.1 Lorentz Field, E2 -- 1.1.8.2 Field of Dipoles Inside Cavity, E3 -- 1.1.9 Dielectrics Losses -- 1.1.9.1 Dielectric Loss Angle -- 1.1.9.2 Total and Specific Dielectric Losses -- 1.1.10 Dielectrics Breakdown -- References -- Chapter 2 Pyroelectricity -- 2.1 Introduction -- 2.2 History of Pyroelectricity -- 2.3 Theory of Pyroelectricity -- 2.4 Simple Model of Pyroelectric Effect -- 2.5 Pyroelectric Crystal Symmetry -- 2.6 Piezoelectricity -- 2.7 Ferroelectricity -- 2.7.1 Ferroelectric Phase Transitions -- 2.7.2 Ferroelectric Domains -- 2.7.3 Ferroelectric Domain Wall Motion -- 2.7.4 Soft Mode -- 2.7.4.1 Zonecenter Phonons -- 2.7.4.2 Zoneboundary Phonons -- References -- Chapter 3 Pyroelectric Materials and Applications -- 3.1 Introduction -- 3.2 Theory of Pyroelectric Detectors -- 3.3 Material FigureofMerits -- 3.4 Classification of Pyroelectric Materials -- 3.4.1 Single Crystals --

3.4.1.1 Triglycine Sulphate -- 3.4.1.2 Lithium Tantalate (LT) and Lithium Niobate (LN) -- 3.4.1.3 Barium Strontium Titanate (BST) -- 3.4.1.4 Strontium Barium Niobite (SBN) -- 3.4.2 Perovskite Ceramics -- 3.4.2.1 Modified Lead Zirconate (PZ) -- 3.4.2.2 Modified Lead Titanate (PT) -- 3.4.3 Organic Polymers. 3.4.4 CeramicPolymer Composites -- 3.4.5 LeadFree Ceramics -- 3.4.6 Other Pyroelectric Materials -- 3.4.6.1 Aluminum Nitride (AlN) -- 3.4.6.2 Gallium Nitride (GaN) -- 3.4.6.3 Zinc Oxide (ZnO) -- References -- Chapter 4 Pyroelectric Infrared Detector -- 4.1 Introduction -- 4.2 Device Configurations -- 4.2.1 Thick Film Detectors -- 4.2.2 Thin Film Detectors -- 4.2.3 Hybrid Focal Plane Array Detector -- 4.2.4 Linear Array Detector -- 4.2.4.1 Detector Chip Technology -- 4.2.4.2 Detector Assembly -- 4.2.4.3 Camera System -- 4.2.5 Periodic Domain TFLT™ Detector -- 4.2.5.1 TFLT™ Pyroelectric Detector Fabrication -- 4.2.5.2 TFLT™ Attached to Metalized Silicon -- 4.2.5.3 TFLT™ on Ceramic -- 4.2.5.4 Large Aperture Devices -- 4.2.5.5 Domain Engineered TFLT™ Device -- 4.2.6 Terahertz Thermal Detector -- 4.2.7 PVDF Polymer Detector -- 4.2.7.1 Selfabsorbing Layer Structure -- 4.2.7.2 PVDF Pyroelectric Sensor Assembly -- 4.2.7.3 Sensor Array Specification and Performance -- 4.2.8 TFP Polymer Detector -- 4.2.9 Tetraaminodiphenyl (TADPh) Polymer Detector -- 4.2.9.1 Detector Design -- 4.2.9.2 Detector Sensitivity -- 4.2.10 Integrated Resonant Absorber Pyroelectric Detector -- 4.2.10.1 Detector Design -- 4.2.10.2 Detector Sensitivity -- 4.2.11 Resonant IR Detector -- 4.2.11.1 Principles of Operation of Resonant Detector -- 4.2.11.2 IR Absorbing Coatings and Structures -- 4.2.11.3 Differential Operation and Detector Arrays -- 4.2.11.4 Performance of GaN Resonators -- 4.2.12 Plasmonic IR Detector -- 4.2.12.1 Structure Design -- 4.2.12.2 Fabrication and Performance of the Detector -- 4.2.13 Graphene Pyroelectric Bolometer -- 4.2.13.1 Device Architecture -- 4.2.13.2 Device Performance -- References -- Chapter 5 Pyroelectric Energy Harvesting -- 5.1 Introduction -- 5.2 Theory of Pyroelectric Energy Harvesting -- 5.3 Pyroelectricity in Ferroelectric Materials. 5.3.1 Thermodynamic Cycles of PyEH -- 5.3.1.1 Carnot Cycle -- 5.3.1.2 Ericsson Cycle -- 5.3.1.3 Olsen Cycle -- 5.4 Pyroelectric Generators -- 5.5 Pyroelectric Nanogenerators -- 5.5.1 PolymerBased Pyroelectric Nanogenerators -- 5.5.1.1 PyNGs Driven by Various Environmental Conditions -- 5.5.1.2 Development of Pyroelectric Materials -- 5.5.1.3 Wearable Pyroelectric Nanogenerators -- 5.5.1.4 Hybrid Pyroelectric Nanogenerators -- 5.5.2 CeramicBased Pyroelectric Nanogenerators -- 5.5.2.1 ZnOBased Pyroelectric Nanogenerators -- 5.5.2.2 PZTBased Pyroelectric Nanogenerators -- 5.5.2.3 LeadFree CeramicBased Pyroelectric Nanogenerators -- 5.5.3 Thermal NanophotonicPyroelectric Nanogenerators -- 5.5.4 Challenges and Perspectives of Pyroelectric Nanogenerators -- References -- Chapter 6 Pyroelectric Fusion -- 6.1 Introduction -- 6.2 History of Pyroelectric Fusion -- 6.3 Pyroelectric Neutron Generators -- 6.4 Pyroelectric Xray Generators -- 6.4.1 Applications -- 6.4.2 Features -- References -- Index -- EULA.
