

1. Record Nr.	UNINA9910964244303321
Titolo	Bolometers : theory, types and applications / / Torrence M. Walcott, editor
Pubbl/distr/stampa	New York, : Nova Science Publishers, c2011
ISBN	1-61728-735-0
Edizione	[1st ed.]
Descrizione fisica	1 online resource (213 p.)
Collana	Physics research and technology
Altri autori (Persone)	WalcottTorrence M
Disciplina	539.7/7
Soggetti	Bolometer Bolometer - Industrial applications Detectors Electromagnetic devices Terahertz technology
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Intro -- BOLOMETERS: THEORY, TYPES AND APPLICATIONS -- BOLOMETERS: THEORY, TYPES AND APPLICATIONS -- CONTENTS -- PREFACE -- Chapter 1 THIN FILM MICRO-BOLOMETERS WITH SI-GE THERMO-SENSING FILMS DEPOSITED FROM PLASMA DISCHARGE -- ABSTRACT -- 1. INTRODUCTION -- 2. PRINCIPLE OF PERFORMANCE -- 2.1. Bolometer Operation -- 2.2. Characteristics of the Bolometer -- a) Responsivity -- b) Noise -- c) Detectivity -- d) Thermal Response Time -- 3. REQUIREMENTS FOR DESIGN AND MATERIALS -- 3.1. Properties of Bolometer Materials -- a) Temperature Coefficient of Resistance -- b) Thermal Conductance -- c) Thermal Capacitance -- 4. SILICON-GERMANIUM AS THERMO-SENSING MATERIAL DEPOSITED BY PLASMA -- 4.1. Different Thermo Sensing Materials -- 4.2. Study of Silicon-Germanium Thin Films Deposited by Plasma -- a) Deposition rate (Vd) -- b) Composition -- c) Electrical Properties -- 4.3. Study of Silicon-Germanium-Boron Alloys as Thermo-Sensing Films -- a) Samples Preparation -- b) Results of Films Characterization -- 5. MODELING -- 5.1. Introduction -- 5.2. 2D Modeling -- 5.3. Results of Modeling -- 5.4. Experimental Results Relevant to Modeling -- 6. MICRO-BOLOMETERS CONFIGURATIONS AND FABRICATION -- 6.1. Micro-

Bolometer Configurations -- 7. CHARACTERIZATION OF MICRO-BOLOMETERS -- 7.1. Characterization of Temperature Dependence of Conductivity in the Films and Estimation of Thermal Coefficient of Resistance, TCR -- 7.2. I(U) Measurements in Dark and under Infrared (IR) Radiation -- 7.3. Calculation of Responsivity -- 7.4. Noise Measurements -- 7.5. Calculation of Detectivity -- 7.6. Thermal Response Time Characterization -- 7.7. Temperature Dependence of Thermal Resistance and Calibration Curve -- 8. MICRO-BOLOMETERS IN THZ REGION -- 8.1. Experimental Details -- 8.2 Results -- 9. ALTERNATIVE (NON-RESISTIVE) MICROBOLOMETERS -- 10. COMMERCIALLY AVAILABLE DEVICES.

11. SUMMARY -- ACKNOWLEDGMENT -- REFERENCES -- Section 2 -- Section 3 -- Section 4 -- Section 5 -- Section 6 -- Section 7 -- Section 8 -- Section 9 -- Section 10 -- Chapter 2 INVESTIGATIONS OF PROPERTIES OF HIGH TEMPERATURE SUPERCONDUCTING BOLOMETERS -- ABSTRACT -- 1. INTRODUCTION -- 2. BOLOMETER NOISE THEORY AND MODELING -- 2.1. Principle of Bolometer Operation and Theory of Noise in Bolometers -- 2.2. Bolometer Noise Modeling -- 2.2.1. Passive Operational Modes with Constant Current Bias (CCM) and Constant Voltage Bias (CVM) -- 2.2.2. Operational Mode of HTSC Bolometer with Active Negative Electrothermal Feedback (NETF) -- 3. EXCESS 1/F NOISE IN HTSC FILMS FOR BOLOMETERS -- 4. RESULTS OF EXPERIMENTAL NOISE RESEARCH OF HTSC BOLOMETERS -- 4.1. Noise of Antenna-Couple HTSC Microbolometers -- 4.2. Noise of HTSC Bolometers Based on Silicon Micromachining Technology -- CONCLUSION -- REFERENCES -- Chapter 3 OPERATING UNCOOLED RESISTIVE BOLOMETERS IN A CLOSED-LOOP MODE -- ABSTRACT -- 1. INTRODUCTION -- Notation Conventions -- Bolometer Principle and Model -- 2. CLOSED-LOOP OPERATION FOR BOLOMETERS -- 2.1. Advantages of Closed-Loop Operation for Bolometers -- 2.1.1. Linearization and Wider Dynamic Range -- 2.1.2. Operation around a Working Point -- 2.1.3. Extended Bandwidth -- 2.1.4. Noise Performance -- 2.2. Implementations of the Closed-Loop Configurations -- 2.2.1. Electrical Substitution or Electric Equivalence Principle -- 2.2.2. Electrical Heat Feedback for Resistive Bolometers -- 2.2.2.1. Type 1 -- 2.2.2.2. Type 2 -- 2.2.2.3. Type 3 -- 2.2.2.4. Comparison -- 3. TOWARD SMART BOLOMETERS -- CONCLUSION -- REFERENCES -- Chapter 4 A SECURITY CAMERA AS AN EXAMPLE FOR A THZ IMAGING APPLICATION -- ABSTRACT -- 1. INTRODUCTION -- 2. THZ CAMERA -- 3. WORKING PRINCIPLE OF TRANSITION EDGE SENSORS -- 4. OPERATION OF TRANSITION EDGE SENSORS -- 4.1. Cooling. 4.2. Radiation Coupling -- 4.3. Thermal Considerations -- 4.4. Mapping Speed and Array Size -- 4.5. Scalability -- 5. TRANSITION EDGE SENSORS FOR A SECURITY CAMERA -- 5.1. Fabrication of Transition Edge Sensors on Silicon Nitride Membranes -- 5.2. Optical System -- 5.3. Scanning System -- 5.4. Amplification Electronics and Data Processing -- 5.5. Camera Performance -- CONCLUSION -- REFERENCES -- Chapter 5 NOISE PROPERTIES OF HIGH-TC SUPERCONDUCTING TRANSITION EDGE BOLOMETERS WITH ELECTROTHERMAL FEEDBACK -- ABSTRACT -- INTRODUCTION -- 2. THEORY -- 2.1. Modes of HTS Bolometer Operation -- 2.2. Characteristics of HTS Bolometers in Passive CCM and CVM Modes -- 2.3. Characteristics of HTS Bolometers in Active ANETF Mode -- 3. NUMERICAL AND EXPERIMENTAL MODELLING -- 3.1. Comparative Numerical Modeling in Passive CCM and CVM Modes -- 3.2. Comparative Numerical and Experimental Modeling in CCM and ANETF Modes -- CONCLUSION -- ACKNOWLEDGMENTS -- REFERENCES -- Chapter 6 COMPARATIVE INVESTIGATION OF PASSIVE AND ACTIVE

OPERATING MODES FOR HIGH-TC SUPERCONDUCTING TRANSITION
EDGE BOLOMETERS WITH ELECTROTHERMAL FEEDBACK FOR INFRARED
WAVES -- ABSTRACT -- 1. INTRODUCTION -- 2. BOLOMETER THEORY
-- 2.1. Modes of HTSC Bolometer Operation -- 2.2. Characteristics of
HTSC Bolometers in CCM and CVM -- 2.3. Characteristics of HTSC
Bolometers in ANETF Mode -- 3. SAMPLES -- 4. NUMERICAL AND
EXPERIMENTAL MODELING -- 4.1. Comparative Numerical Modeling in
Passive CCM and CVM Modes -- 4.2. Comparative Numerical and
Experimental Modeling in CCM and ANETF Modes -- 4.3. Temperature
Stabilization of Bolometer Operating Point -- CONCLUSION --
ACKNOWLEDGMENTS -- REFERENCES -- Chapter 7 EXPERIMENTAL
MODELLING ACTIVE STRONG ELECTROTHERMAL FEEDBACK MODE FOR
HIGH-TC SUPERCONDUCTING BOLOMETER ON SILICON NITRIDE
MEMBRANE -- ABSTRACT -- 1. INTRODUCTION -- 2. BOLOMETER
THEORY.
3. EXPERIMENTAL TECHNIQUE AND RESULTS -- CONCLUSION --
REFERENCES -- Chapter 8 YBCO FILMS ON SRTIO3 SUBSTRATES WITH
RECORDLY LOW 1/F NOISE FOR BOLOMETER APPLICATIONS --
ABSTRACT -- 1. INTRODUCTION -- 2. NOISE EQUIVALENT POWER AND
NOISE VOLTAGE OF HTSC BOLOMETER -- 3. SAMPLES AND
EXPERIMENTAL TECHNIQUE -- 4. MAIN RESULTS OBTAINED AND
DISCUSSION -- 5. ESTIMATION OF BOLOMETERS -- CONCLUSION --
ACKNOWLEDGMENTS -- REFERENCES -- Chapter 9 ABSOLUTE HIGH-
TC SUPERCONDUCTING RADIOMETER WITH ELECTRICAL-SUBSTITUTION
FOR X-RAYS MEASUREMENTS -- ABSTRACT -- 1. INTRODUCTION -- 2.
DESIGN, PRINCIPLE AND CHARACTERISTICS OF RADIOMETER -- 2.1.
Design and Principle of Operation -- 2.2. Calculated Characteristics --
3. INTERACTION OF THE RADIOMETER WITH RADIATION -- Effect of
Radiometer Interaction with Radiation on Accuracy of Measurements --
Other Factors Having Influence on Efficiency of Radiometer
Measurements -- 4. CONCLUSION -- ACKNOWLEDGMENTS --
REFERENCES -- INDEX -- Blank Page.

Sommario/riassunto

Gathers and presents research in the study of bolometers including investigations of properties of high temperature superconducting bolometers, operating uncooled resistive bolometers in a closed-loop mode, as well as a review on thin-film micro-bolometers with Si-Ge thermo-sensing films deposited from plasma discharge.