

CONTENTS

	Page
<u>SECTION 1. ELECTRON AND ION BEAM PHYSICS AND RELATED TOPICS</u>	
An Electronic Analog of Relativistic Space Homer B. Tilton	3
New Space-Charge Flow Solutions Useful for Gun Design B. Komatsu, H. Hamada, and M. Terada	15
Some Aspects of Flow Visualization and Local Density Measurements in Rarefied Gases by Means of Electron Beam Probes B. W. Schumacher	31
Power Density Limits for the Particle Penetration Laws and the Onset of Energy Phenomena in Electron Beam Targets B. W. Schumacher	74
Characteristic Properties of Duoplasmatron-Type Ion Sources, and of Extracted Beams G. Gautherin, C. Lejeune, and A. Septier	94
Backscattering of Kilovolt-Electron Beams Claude A. Klein	113
An Experimental Investigation of a High-Voltage Electron-Bombardment Ion Thruster David C. Byers	122
Composite Ion Accelerator Grids Bruce Banks	163
Alkali Metal Ion Sources Julius Perel	184
Current Density Distribution in Beams from Cold Hollow Cathodes L. H. Stauffer	206
High Output Plasma Electron Beam Seiichiro Kashu, Shuji Nishino, and Chikara Hayashi	221
Some Observations on High Power Electron Beams Under Water B. W. Schumacher	236

Recent Developments in the Application of Laser-Surface Interactions A. S. Gilmour, Jr. and R. J. Clark, Jr.	254
<u>SECTION 2. ELECTRON BEAMS IN MATERIALS PROCESSING:</u>	
<u>PART A: ELECTRON BEAM WELDING</u>	
<u>PART B: MELTING, REFINING AND EVAPORATION</u>	
Effect of Electron Scattering in the Metal Vapor on the Energy Dissipation in the Cavity Present During Electron Beam Welding D. C. Schubert and B. W. Schumacher	269
Energy Considerations in Electron Beam Welding Paul G. Klemens	291
Present Knowledge of the Fundamental Processes of Electron Beams as Material Working Tools Helmut Schwarz	301
Basic Research on Welding with Electron Beams of High Intensity A. Matting and G. Sepold	318
Materials Removal Processes in Laser and Electron Beam Machining G. Pahlitzsch and A. Visser	335
The Influence of Electron Beam Focusing on the Shape and Dimensions of Welds in the Electron Beam Welding Process M. Boncoeur, J. Y. Marhic, and M. Rapin	358
Metal Mixing During Electron Beam Welding P. Shahinian, J. T. Atwell, and E. J. Brooks	384
Penetration Variations in Electron Beam Welding G. K. Hicken and W. G. Booco	398
New Developments in Electron Beam Welding Technique of Nuclear Reactor Structure Components P. Thomé and R. Roudier	412
Short Term Production Applications for Electron Beam Welding M. M. Schwartz	433
Electron Beam Cutting of Rocks and Concrete B. W. Schumacher	447

Ultrahigh-Vacuum Zone Purification of Zirconium with Analysis of Partial Pressures D. S. Easton and J. O. Betterton	469
New Electron Beam Optics for the Preparation of Insulating Crystals by the Floating Zone Method Charles E. Ryan, Dennis P. Considine, John J. Hawley, and Robert C. Marshall	501
Sources of Contamination during Electron-Beam Melting R. E. Reed, C. W. Dean, R. E. McDonald, and J. F. Emery	516
Evaporation of Isotopically Enriched Stable and Radioactive Materials by Electron Bombardment Heating H. L. Adair, E. H. Kobisk, and F. R. O'Donnell	530
Application of Vapor Deposition Technique in the Metallurgical Industry S. Schiller, H. Förster, P. Lenk, and B. Wenzel	539
Measuring Thin Aluminum Coatings on Steel by Means of an Electron Probe Eldon L. Keller and Berthold W. Schumacher	551
<u>SECTION 3. ELECTRON AND ION BEAMS IN MICROELECTRONICS</u>	
High Resolution Electron Beam Techniques for Transistor Fabrication J. M. S. Schofield, H. N. G. King, and R. A. Ford	561
Rapid Direct Formation of Siliceous Diffusion Barriers by Electron Beams E. D. Roberts.....	571
Application of Electron-Beam-Induced Conductivity to Measurement of Resistivity, Electric Field and Potential Distributions in GaAs Chusuke Munakata	580
The Transport of Excess Carriers in Diffused Silicon Diodes During Electron Beam Irradiation G. J. Sprokel and J. Chin	590
An Electron Beam Digital Recorder Kenneth E. Haughton	624

Requirements on Beam Techniques and Systems for
Ion Implantation Doping of Semiconductor Materials
and Devices
R. G. Wilson, R. R. Hart, D. M. Jamba, and
S. A. Thompson 640

An Ion Implantation System Which Employs a
Velocity Filter for Mass Separation
J. D. Macdougall, F. W. Anderson, K. E. Manchester,
and P. E. Roughan 649

Implantation of Boron and Phosphorus into Silicon
Substrate and Its Application to Range Measurement
Takashi Tsuchimoto 656

SECTION 4. APPENDIX: AUTHORS' SUMMARIES

On the Measurement of Impurity Atom Distributions Arising
From Ion Implantation in High-Resistivity Silicon
D. P. Kennedy, P. C. Murley, and W. Kleinfelder

Introduction of Diffusion Sources by Implantation
P. E. Roughan, A. H. Clark, J. D. Macdougall,
K. E. Manchester, and F. W. Anderson

Evaluation of Ion Implantations into Silicon by
Hall Measurements
G. A. Shifrin, R. Baron, O. J. Marsh, and J. W. Mayer

Electrical Characteristics of Ion Implanted
Gallium Arsenide
R. G. Hunsperger and O. J. Marsh

Advantages of Electron-Beam Heating in a
Metallurgical Heat-Treating Furnace
J. C. Wilson

Poisoning of LaB_6 Cathodes
H. E. Gallagher

Cold Cathode as a Metalworking Tool
Marvin L. Kohn

Some Recent Developments in E.B. Welding Equipment
and Its Applications
J. Sommeria

- Dynamic Voltage Contrast Display Using the
Stroboscopic Scanning Electron Microscope**
G. S. Plows and W. C. Nixon
- Examination of Metal-Insulator-Semiconductor Structures
by Scanning Electron Microscopy**
D. V. Sulway and P. R. Thornton
- Detection of Compositional Variations using the
Scanning Electron Microscope**
D. A. Shaw and P. R. Thornton
- Time Resolved Scanning Electron Microscopy of Electric
Fields in CdS Oscillators**
N. C. MacDonald and R. M. White
- Factors Covering Contrast in Scanning Electron
Micrographs of Thin Oxide Layers**
David Green
- Electron Microprobe Investigation of Integrated
Circuit Metallization**
James E. Cline, Rosemary P. Beatty, and
Jon Gerhard
- The Application of Electron Beam Fabrication to
Large Scale Integration**
M. W. Larkin, R. K. Matta, and P. R. Malmberg
- Electron Beam Techniques for High Resolution
Circuit and Mask Fabrication**
M. Hatzakis
- Design of Anastigmatic Coils for Deflecting Micron
Size Electron Beams**
A. Speth
- A 10 Kev, 0.5 Ampere Rocket-Borne Electron Accelerator**
W. C. Beggs, R. Elcox, R. Harrison, and F. McCoy