

	<i>Page</i>
Foreword	iii
Executive Body and Organization, American Vacuum Society	iv
Symposium Notes	vi
Symposium Personalities	ix
Symposium Sessions and Moderators	xi

PART I
THIN FILM SYMPOSIUM

Section I
Nucleation and Growth Phenomena in Thin Films
(Invited Papers)

	<i>Page</i>
Nucleation and Growth of Films—T. N. Rhodin and D. Walton	3
Two Dimensional Model for Crystallization from the Vapor Phase— J. C. Courvoisier, L. Jansen and W. Haidinger	14
A Method for High-Resolution Studies of Thin Film Growth— H. Poppa	21
Some Initial Growth Studies on Dielectrics and Metals—D. S. Campbell	29
Fiber Texture—E. Bauer	35
Electrical Resistivity of Ultra Thin Metal Films—C. A. Neugebauer .	45

Section II
Preparation and Properties of Thin Films
(Invited Papers)

Single Crystal Films of Ferromagnetic Materials—O. S. Heavens .	52
Structure and Anisotropy in Magnetic Films—M. Prutton	59
Surface Migration and Place Exchange—H. E. Farnsworth	68
Vanadium Films Evaporated Onto Liquid Helium Cooled Substrates in Ultra-High Vacuum—J. C. Suits	74

Table of Contents

Page

Section III
Preparation and Properties of Thin Films
(Contributed Papers)

Tantalum Crystal Chemistry in the Electron Microscope—C. J. Calbick and N. Schwartz	81
Effect of Ceramic Substrates on the Resistance of Vacuum Deposited Thin Metal Films—B. L. Coffman and H. Thurnauer . .	89
Titanium Oxide Films—C. A. Willis, J. M. Winter and M. Lauriente	96
The Relationship of Deposition Parameters to the Structure and the Magnetic Properties of Evaporated Ni-Fe Thin Films—J. H. Engelman and A. J. Hardwick	100
Simulation and Examination of Some Classic Distillation Source Geometries—C. Bugenis and L. E. Preuss	105
Films of Uniform Thickness Obtained from a Point Source—K. H. Behrndt	111
Thickness and Rate Monitor for Evaporated Silicon Monoxide Films—F. Z. Keister and R. Y. Scapple	116
Mechanical Properties of Silicon Oxide Films—J. R. Priest, H. L. Caswell and Y. Budo	121
Boron Film Preparation Using an Electron Beam Evaporator—H. L. Adair and E. H. Kobisk	125
Time Resolved Studies of Vacuum Deposited Alloy Films by X-Ray Emission Spectroscopy—J. J. Finnegan and P. R. Gould	129
Vacuum Fabrication of Thin-Film Cryogenic Devices—L. Ames, M. F. Gendron and H. Seki	133
Vacuum Evaporator for the Fabrication of Multilayer Thin-Film Devices—H. L. Caswell and J. R. Priest	138
Production Equipment for Thin-Film Circuitry Panels—W. Himes, B. F. Stout and R. E. Thun	144
A Study of Evaporated Chromium Films—K. B. Scow and R. E. Thun	151
Research on Thin-Film Triodes—Electron Injection—D. A. McNeill and D. A. Contini	156

Table of Contents

Page

Section IV
Thin Films and Sputtering
(Contributed Papers)

Time of Flight Measurements of Velocities of Sputtered Atoms— R. V. Stuart and G. K. Wehner	160
The Sputtering of Compounds—S. P. Wolsky, D. Shooter and E. J. Zdanuk	164
Electrical Properties of Sputtered Tantalum Films—L. I. Maissel	169
Tantalum Films, Deposition Process and Film Properties— C. Altman	174
A Flexible, Rapid Sputtering System—H. Isaak	180
An Evaluation of Oxide Films of Lead and Tellurium Prepared by Reactive Sputtering—F. G. Peters and C. L. Mantell	184
Grain Boundary Diffusion in Sputtered Tantalum Films—P. M. Schabale and L. I. Maissel	190

PART II
SPACE PROBLEMS SYMPOSIUM

Section I
Cryopumping
(Contributed Papers)

Some Investigations of Cryotrapping—F. W. Schmidlin, L. O. Heflinger and E. L. Garwin	197
A Theoretical Evaluation of the Sticking Coefficient in Cryopumping—B. A. Buffham, P. B. Henault and R. A. Flinn . .	205
Effect of Gas Condensate on Cryopumping—B. C. Moore	212
Cryogenic Pump Systems Down to 2.5° K—W. Bächler, G. Klipping and W. Mascher	216
Some Characteristics of a Simple Cryopump—L. O. Mullen and R. B. Jacobs	220
Operational Characteristics of a Cryopump Used in a Low Density Wind Tunnel—J. G. Everton	227
Zeolite Absorption Pump for Rocket Borne Mass Spectrometer— R. S. Narcisi, W. M. Brubaker, H. C. Peohlmann, R. P. Fedchenko and F. B. Wiens	232
Sorption Pumping at Pressures Less than 10 ⁻⁵ Torr—N. M. Kuluva and E. L. Knuth	237
Vacuum Pumping by Cryosorption—S. M. Kindall and E. S. J. Wang	243

Table of Contents

Page

Section II
Space Systems
(Contributed Papers)

The Design and Testing of a Large Space System Pumping Module— R. P. LeRiche and J. H. Rothenberg	249
Thermal Analysis of Space Simulation Chambers—N. Beecher . . .	253
Thirty Foot Space Thermal Environment Simulator with a New Solar Simulator—A. D. LeVantine	260
A Temperature Cycling Technique for Obtaining 10^{-9} Torr in Large Vacuum Chambers—E. R. Wells and H. Postma	266
Performance of Environmental Chambers for the 10^{-10} Torr Range Using Oil Diffusion Pumps—T. M. Miller and K. A. Geiger . . .	270
1×10^{-11} Torr in Large Metal Chambers, Its Attainment and Ap- plication Results—I. Farkass, P. R. Gould and G. W. Horn . . .	273
Operation of a Twenty Cubic Foot Chamber in the 10^{-11} Torr Range—J. C. L. Shabeck, Jr.	278
Report on Three 32,000 Cubic Foot Space Simulation Systems— J. Richman and C. B. Hood	282
Materials Selection and Development for Application in Inter- Planetary Vehicles—L. J. Bonis and G. S. Ansell	287

Section III
Degassing and Space Materials
(Contributed Papers)

The Effect of Bake-Out on the Degassing of Metals—B. B. Dayton .	293
Investigation on the True Desorbing Area of Solids in Vacuum— A. Schram	301
Outgassing Studies of Space Materials—C. P. Boebel and N. A. Mackie	307
Cohesion of Clean Surfaces and the Effect of Adsorbed Gases— P. J. Bryant	311
Ultra High Vacuum and High Temperature Friction and Self-Welding Facilities—L. G. Kellogg and S. Giles	314
Behavior of Organic Materials at Elevated Temperatures in Vacuum—S. Podlaseck, J. Suhorsky and A. Fisher	320
Sublimation of Some Polymeric Materials in Vacuum—M. M. Fulk and K. S. Horr	324
Study of the Vacuum Wettability of a Liquid Metal on a Solid Metallic Surface—G. Armand and J. Lapujoulade	334
The Low Pressure Gas Desorption of Some Polymeric Materials— M. Rivera, W. M. Fassell, Jr., and J. Jensen	342

Table of Contents

Page

PART III
GENERAL VACUUM TECHNIQUES AND COMPONENTS

Section I
Getter-Ion Pumps, Sputter-Ion Pumps and High Voltage
(Contributed Papers)

Theoretical Considerations in Sputter-Ion Pump Design—G. Carter	351
Performance of a Six Inch Triode P.I.G. Pump Compared to a Perfect Pump—N. Milleron and F. S. Rienath	356
A Sublimation Pump—C. L. Gould and P. Mandel	360
Getter-Ion Pumping and Partial Pressure Measurements Below 10^{-11} Torr—W. D. Davis	363
The Electrically Suspended Gyroscope, Design of its Vacuum Pump and System—J. B. Uhlir, W. R. Dahl, L. P. Levine and R. O. Barrett	371
High Voltage Problems in Vacuum—T. J. Holce	376
Leak Detection Using Current Changes in Ionization Gauges and Sputter-Ion Pumps—J. W. Ackley, A. E. Barrington, A. B. Francis, R. L. Jepsen, C. F. Lothrop and H. Mandoli	380

Section II
Oil Diffusion Pumps, Fluids and Oil Pumped Systems
(Contributed Papers)

The Problem of Contamination in Oil Diffusion Pump Systems—M. H. Hablanian and A. A. Landfors	384
Behavior of Residual Oil Vapor and Back Diffusion of Diffusion Pumps—A. Fujinaga, T. Hanasaka and H. Tottori	390
Elimination of Pressure Fluctuations Above Oil Diffusion Pumps—W. Bächler	395
Evaluation of a New Silicone Fluid for Diffusion Pumps—D. J. Crawley, E. D. Tolmie and A. R. Huntress	399
Progress on Optimization of Oil Diffusion Pump Systems for Ultra-High Vacuum IV—N. Milleron and L. L. Levenson	404
Monte Carlo Analysis of High Speed Pumping Systems—J. D. Pinson and A. W. Peck	406
Vacuum System for the Naval Research Laboratory Electron Storage Ring—T. J. O'Connell	411
Vacuum System for Automatic Contact Microradiography with Soft X-Rays—U. Friberg and J. F. Burke	415

Table of Contents

Page

Section III
Gauges and Vacuum Measurement
(Contributed Papers)

Residual Vacuum Analysis with Nude Source Time-of-Flight Mass Spectrometer—D. C. Damoth and R. G. Burgess	418
The Measurement of Pressure in Ultra-High Vacuum Systems—W. Steckelmacher	421
A Photo-Current Suppressor Gauge for the Measurement of Very Low Pressure—W. C. Schuemann	428
Bayard-Alpert Gauge with Reduced X-Ray Limit—H. J. Schutze and F. Stork	431
The Hot Cathode Magnetron Ionization Gauge with an Electron Multiplier Detector—J. M. Lafferty	438
Transient Measurements by Vacuum Gauge Systems—S. L. Soo and A. B. Huang	443
Anomalous Behavior of Ionization Gauges Operated at Low Grid Currents—J. W. Ackley, C. F. Lothrop and W. R. Wheeler . . .	452
Calibration of the Bayard-Alpert Type Ionization Gauge with a Field Emission Microscope—R. P. Little and W. T. Whitney . .	456
A Simple High Vacuum Gauge Calibration System—W. H. Hayward and R. L. Jepsen	459
Study of Knudsen's Method of Pressure Division of Pressure Division as a Means of Calibrating Vacuum Gauges—S. Schumann . .	463
Design of an Interferometric Oil Manometer for Vacuum Measurement—A. M. Thomas, D. P. Johnson and J. W. Little . .	468
A New Logarithmic Ion-Gauge Control—H. B. Frost	474

Section IV
Surface Physics
(Contributed Papers)

Surface Properties Asymmetries in Compound Semiconductors—J. A. Dillon, Jr., and R. M. Oman	479
Use of the Flow-Method to Study the Kinetics of Gases on Clean Surfaces—W. H. Orr	484
Thermal Desorption of Argon in an Ionization Pump—P. G. Smeaton, G. Carter and J. H. Leck	491

Table of Contents

	<i>Page</i>
Investigations of Gas-Solid Interactions by Electron Bombardment— D. A. Degras, L. A. Petermann and A. Schram	497
Ion Induced Re-Emission of Inert Gases in an Ionization Pump— L. H. James and G. Carter	502
Replacement of Chemisorbed Gases on Tungsten—J. L. Robins . .	510
Stability of Fatty Monolayers in Vacuum—R. W. Roberts and G. L. Gaines, Jr.	515
Color Production from Energetic Ions Impinging on Metals—K. W. Ehlers	519
Author Index	527