

CONTENTS

OPENING ADDRESS AND PLENARY LECTURES

Layer Growth - An Atomic Picture.—G. Ehrlich.....	3
Surface Phonon Spectroscopy.—H. Ibach	17
Surface Processes in the Nucleation and Growth of Thin Films.—J. A. Venables	26
Limits of Vacuum Production and Measurement.—J. P. Hobson.....	35
Molecular Beam Epitaxy: Applications to Basic Research and Device Fabrication.—A. Y. Cho.....	49

SURFACE SCIENCE

Surface Analysis: Being a Consideration of the Status of the Two Most Popular Surface Analysis Techniques.—M. P. Seah	63
Measurement of Surface Defects by Low Energy Diffraction.—M. Henzler	76
Surface Topographies Observed in Real Space.—G. Binnig and H. Rohrer.....	77
(110) and (111) Surface Reconstructions of C, Si and Ge.—D. J. Chadi	80
Internal State Distributions of Molecules Scattering and Desorbing from Surfaces.—D. J. Auerbach	89
Surface Diffusion of Adsorbates and Phase Transitions in Adsorbed Layers.—A. G. Naumovets	90
The Electronic Structure of Oxide Surfaces and Surface Defects.—V. E. Henrich and R. L. Kurtz	100
Charge Transfer, Excitation and Energy Transfer for Atoms Moving near Metal Surfaces.—R. Brako, K. Makoshi and D. M. Newns.....	108
Reconstruction of Semiconductor Surfaces.—G. Jezequel, A. Barski, R. Pinchaux and Y. Petroff.....	119
Determination of He-Metal Interaction Potential from Elastic and Inelastic Scattering.—N. García	120
On the Chemistry and Alchymie of Metallic Catalysts.—V. Ponec	121
Chemisorption and Reactions on Surfaces Using Theoretical Studies on Finite Clusters.—W. A. Goddard III	128
Structure and Phase Transitions in Physically Adsorbed Films of Nitrogen and Oxygen Molecules on Graphite.—S. C. Fain, M. F. Toney and R. D. Diehl	129
Basic Problems in Interconnect Metallization for VLSI Applications.—P. S. Ho	138
Electronic and Structural Properties of Thin Metal Overlays on III-V Compounds.—I. Lindau, W. E. Spicer, T. Kendelewicz and W. G. Petro.....	140
The Electrochemical Interface: Structure and Thermodynamics.—D. M. Kolb and D. A. Scherson.....	158
Thermal Desorption and Comprehension of Adsorption-Desorption Mechanisms.—A. Cassuto	179

VACUUM SCIENCE

Accuracy in Vacuum Measurement.—G. Reich	195
Mass Spectrometry Applied to Vacuum and Plasma Processes.—W. K. Huber.....	202
Directional Detectors for Gas Molecules and their Applications to the Direct Measurement of Gases Released from Surfaces.—Y. Tuzi and M. Kobayashi	203
Technology and Applications of Turbomolecular Pumps.—W. Becker and K. H. Bernhardt	212
Production of Clean Vacuum with Cryopumps.—H. G. Noeller.....	217
Leak Testing Using a Helium Mass Spectrometer on Industrial Scales.—A. E. Holme	227
Leak Testing and Repair of Fusion Devices.—T. A. Kozman	233
Hard Metallurgical Coatings.—R. F. Bunshah	240
Electron-Beam Processing in Metallurgy.—S. Schiller, H. Förster, G. Jäsch, G. Hötzsch and B. Wenzel.....	246
Vacuum and Space Projects.—H. Curien and A. Rolfo.....	258
Vacuum Research in Space - Research in Space Vacuum.—P. Kleber	264
The Vacuum System of LEP.—LEP Vacuum Group, presented by H. P. Reinhard	273
Design and Construction of Vacuum Systems for Large Colliders Using Superconducting Magnets.—H. Haimala.....	283

THIN FILMS

Deposition of Metastable Films by Ion Beam and Plasma Techniques.—C. Weissmantel	299
Thick Deposits and Overlays for Fusion Reactor Applications.—D. Mattox.....	309
Analysis of Thin Film Interfaces.—H. Oechsner	316
Preparation, Characterization and Properties of Amorphous Tetracoordinated Compound Semiconductors.—M. L. Theye	324
Preparation, Structures and Properties of Hydrogenated Amorphous Silicon Films and Related Materials.—W. Paul	335
Structures and Electronic Properties of Composite Thin Films.—G. Deutscher	344
Free Electrons in Polycrystalline Films.—H. Hoffmann	351

Phase Transitions in Metal Submonolayer Systems.—E. Bauer and J. Kolaczkiewicz	363
Novel Aspects in Nucleation Studies.—M. Krohn and H. Bethge	373
Impurity Effects in the Structural Development of Vacuum Deposited Thin Films.—P. B. Barna.....	382
Structure and Properties of Microcrystalline Materials.—H. Gleiter	397
Thermal Consideration in the Selection of Optical Materials for Thin Film Laser Coatings.—M. Lange, J. McIver and A. H. Guenther	407
Control of Stress and Properties in Sputtered Metal Films on Nonconductive and Heat-Sensitive Substrates.—D. W. Hoffman and C. Peters	415

ELECTRONIC MATERIALS AND PROCESSING

Submicron Lithography.—G. Pircher	427
Pattern Transfer Technology in the Micron and Submicron Range.—P. Tischer	445
Polymers with Special Properties for Electronic and Microelectronic Applications.—C. D. Eisenbach	455
Fundamental Aspects of Reactive Plasma Etching.—C. J. Heslop	462
Gas Plasma Etching of Chromium Films and its Applications to LSI Manufacturing.—T. Yamazaki, Y. Suzuki and H. Nakata	472
Insulating Films on III-V: Deposition by Plasma or CVD, <i>in situ</i> Analysis, Electrical Characterization.—J. B. Theeten, S. Gourrier, P. Friedel, Y. Demay, S. Makram-Ebeid and D. Benarroche	479
Electronic Properties of Semiconductor Superlattices.—M. Voos	480
Approaches towards Three-Dimensional Structures for Novel Device Integration.—T. Tsurushima and K. Mizusawa	488
Materials for Flat Panel Displays: The Role of Thin Films, Surfaces and Interfaces.—M. G. Clark	499
Recent Trends in Surface Analysis with High Spatial Resolution.—H. E. Bishop	510

FUSION

Construction and Startup Test of Princeton TFTR.—P. J. Reardon	517
Construction and Commissioning of JET, the Joint European Torus.—G. Duesing	518
The Vacuum and Surface Technological Aspects of the JT-60 Tokamak.—Y. Murakami	532
Construction and Operational Experience of the Tandem Mirror Experiment Upgrade (TMX-U).—A. K. Chargin, M. O. Calderon and T. L. Moore	544
Cryogenic and Vacuum Systems in TORE SUPRA Supraconductor Tokamak.—R. Aymar, J. J. Cordier, C. Deck, A. Gauthier, P. Deschamps, R. Gravier, M. Lipa and J. P. Perin	554
Vacuum System for Reacting Plasma Tokamak at Institute of Plasma Physics in Nagoya.—K. Akaishi	562
Tokamak Advanced Pump Limiter Experiments and Analysis.—R. W. Conn	568
Partial Pressure Analysis of Plasmas.—H. F. Dylla	578
Plasma Diagnostics in Tokamaks.—C. de Michelis	589
Correlation between Surface Effects and Edge Plasma Behaviour in Large Tokamaks.—G. Staudenmaier and P. Staib	597
Low Energy Neutral Hydrogen Atom Emission from Tokamaks.—S. A. Cohen and D. Ruzic	598
Depth Profiling of Implanted Gases in Solids.—B. Terreault	599
Physical and Chemical Sputtering of Low-Z Compound Materials.—T. Yamashina	614
Synergistic Effects in Chemical Erosion of First Wall Components.—E. Vietzke, M. Erdweg, K. Flaskamp and V. Philipps	627
Microtarget Fabrication Activities in the U.K.—P. T. Rumsby	635
Target Fabrication and Development in the Centre d'Etudes de Limeil.—X. Clement, A. Coudeville, P. Eyharts, J. P. Perrine and R. Rouillard	642
Inertial Confinement Fusion Microtarget Fabrication and Characterization in Japan.—Y. Izawa	651
Inertial Confinement Fusion Microtarget Fabrication and Characterization in the U.S.A.—R. J. Fries	653
Tritium Handling in Plasma Fusion Devices.—D. Leger	654
Early Experience with the Tritium Systems Test Assembly.—J. L. Anderson	659
Neutral Beam Injector Development in the U.S.A.—R. V. Pyle	665
Vacuum System for Long Pulse and High Power Neutral Beam Injector: The Status of Japan NBI Develop- ment.—T. Kuroda and O. Kaneko	675
Pellet Injection into Plasma Devices at Garching.—K. Büchl	686
Fueling of Fusion Devices by Pellet Injection: Development in the U.S.A.—C. D. Hendricks	687
First Wall Conditioning at TEXTOR.—F. G. Waelbroeck, J. Winter, P. Wienhold, L. Könen, T. Banno, L. Grobusch, E. Rota, K. G. Tschersich, R. E. Clausing and TEXTOR-Team	693
Wall Conditioning in JET.—K. J. Dietz	706
ECR Discharge Cleaning of Toroidal Machines.—Y. Sakamoto	716

EDUCATION IN VACUUM SCIENCE AND ITS APPLICATIONS

Growth of Vacuum Technology through Education and Training.—P. Vijendran	727
--	-----