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Properties and Processing of Vapor-Deposited Coatings

Editors: Roger N. Johnson, Woo Y. Lee, Michael A. Pickering and Brian W. Sheldon

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Properties and Processing of Vapor-Deposited Coatings

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Frontmatter
[More information](#)

CONTENTS

Preface xi

Acknowledgments xiii

Materials Research Society Symposium Proceedings xiv

PART I: MULTILAYERED COATINGS

*Multilayer Coatings and Optical Materials for Tuned
Infrared Emittance and Thermal Control 3
P.M. Martin, J.W. Johnston, and W.D. Bennett

Deposition of Epitaxial Carbide Films and Superlattices
by Co-Evaporation of C₆₀ and Transition Metals 13
H. Högberg, L. Norin, J. Lu, J.O. Malm, and U. Jansson

Metal/Silicon Multilayers Produced by Low-Temperature MOCVD 19
*F. Hamelmann, G. Haindl, A. Klipp, E. Majkova, U. Kleineberg,
P. Jutzi, and U. Heinzmann*

PART II: MECHANICAL PROPERTIES

Low Stress Under Bump Metallizations for Direct
Chip Attach 27
P. Su, T.M. Korhonen, S.J. Hong, M.A. Korhonen, and C.Y. Li

Thickness Effect on Cracking Phenomena and Mechanical
Properties of Submicron Glass Thin Films Deposited on a
Polymer Substrate 33
M. Yanaka, Y. Kato, Y. Tsukahara, and N. Takeda

PART III: PROPERTIES AND PROCESSING
OF PVD COATINGS

*Property and Processing Comparison of Optical Coatings
Made by Ion Assisted Evaporation and Magnetron Sputtering 41
W.T. Pawlewicz

Process Windows and Properties of Tungsten- and
Vanadium-Oxides Deposited by MSIP-PVD-Process 53
O. Knotek, E. Lugscheider, S. Bärwulf, and C. Barimani

Effect of Processing Parameters on the Chemistry of
Magnetron Sputtered Ti-Al Thin Films 59
A.S. Kale, S. Seal, K. Beaulieu, and K.B. Sundaram

*Invited Paper

Cambridge University Press
978-1-107-41391-7 - Materials Research Society Symposium Proceedings: Volume 555:
Properties and Processing of Vapor-Deposited Coatings
Editors: Roger N. Johnson, Woo Y. Lee, Michael A. Pickering and Brian W. Sheldon
Frontmatter
[More information](#)

**PART IV: COATINGS FOR HARSH
ENVIRONMENTS**

**The Oxidation of Ni and Ni-20Cr Deposited With Chromia
Thin Films Via Combustion CVD 67**
P.A. Alexiou, M.R. Hendrick, and J.M. Hampikian

Oxidation of PECVD Deposited From Trimethylsilane 73
P.A. DiFonzo, M. Massuda, and J.T. Kelliher

**Mullite Diffusion Barriers for SiC-C/C Composites Produced
by Pulsed Laser Deposition 79**
*H. Fritze, A. Schnittker, T. Witke, C. Rüscher, S. Weber,
S. Scherrer, B. Schultrich, and G. Borchardt*

**Optical Properties and Corrosion Resistance of Durable
Silver Coatings 85**
P.D. Fuqua and J.D. Barrie

Novel Uses of Boron Phosphide Films 91
E. Waddell

**Improved Microstructures for Thermal Barrier Coatings
Produced by Glancing Angle Deposition 97**
K.D. Harris, D. Vick, M.J. Brett, and K. Robbie

**High-Temperature Stability of Amorphous Al₂O₃ Deposited
on Si and CeO₂-Stabilized ZrO₂ by Metalorganic Chemical
Vapor Deposition 103**
J.D. Meyer and W.Y. Lee

***Corrosion Resistant Coatings for High-Temperature
Applications 109**
*T.M. Besmann, J.A. Haynes, K.M. Cooley, V.M. Vaubert,
and W.Y. Lee*

PART V: CVD-CHEMISTRY AND KINETICS

***Thermochemistry and Kinetics of Gas-Phase Reactions
Relevant to the CVD of Coatings: New Data for Process Models 121**
M.D. Allendorf, C.F. Melius, and A.H. McDaniel

Improved Conformality of CVD Titanium Nitride Films 135
X. Liu, Y.Z. Lu, and R.G. Gordon

**The Kinetic Investigation of the Deposition of Alumina and
Aluminosilicates from Mixtures of SiCl₄, AlCl₃, CO₂, and H₂ 141**
S.F. Nitodas and S.V. Sotirchos

*Invited Paper

Cambridge University Press
978-1-107-41391-7 - Materials Research Society Symposium Proceedings: Volume 555:
Properties and Processing of Vapor-Deposited Coatings
Editors: Roger N. Johnson, Woo Y. Lee, Michael A. Pickering and Brian W. Sheldon
Frontmatter
[More information](#)

**PART VI: PROPERTIES AND PROCESSING
OF CVD COATINGS AND FILMS**

**Kinetics of Copper Chemical Vapor Deposition From
Cu(hfac) VTMS 149**
M.L.H. ter Heerdt, P.J. van der Put, and J. Schoonman

**Chemical Vapor Deposition (CVD) of Parylene Films
Using Liquid Source Delivery 155**
C. Xu and T.H. Baum

Properties of Catalytic CVD SiN_x for Antireflection Coatings 161
A. Izumi and H. Matsumura

SiO₂ Film Coatings With VUV Excimer Lamp CVD 167
*K. Kurosawa, N. Takezoe, H. Yanagida, R. Nomura, and
A. Yokotani*

**Growth and Stress Characterization of LPCVD SiC Films
Deposited on Bare, Carbonized and Oxidized Si(001)
Substrates 173**
E. Hurtós, J. Rodríguez-Viejo, K. Zekentes, and M.T. Clavaguera-Mora

**Silicon Nitride Coatings Formed Using the Selective Area
Laser Deposition (SALD) Technique 179**
L. Sun, L.L. Shaw, and H.L. Marcus

**The Chemical Vapor Deposition of Zirconium Carbide
Onto Ceramic Substrates 185**
J.A. Glass Jr., N. Palmisiano Jr., and R.E. Welsh

**Zirconia Coatings Deposited by Inductively Coupled
Plasma Assisted CVD 191**
P. Colpo, G. Ceccone, B. Leclercq, P. Salvatore, and F. Rossi

**Characterization of Low-Temperature PECVD Silicon
Dioxide Films 197**
*P.N.K. Deenapanray, J. Lengyel, H.H. Tan, M. Petravic,
A. Durandet, J.S. Williams, and C. Jagadish*

**A New Low Temperature Chemical Vapor Deposition Technique
for Growing Thin Films of Ti, TiN on Copper and TiO₂, Ti_xSi_y
on Silicon 203**
J.H. Hendricks, M.I. Aquino, and M.R. Zachariah

**Temperature Dependence of Wafer Backside Deposition in
Single Wafer CVD Reactor 209**
Q. Wang, D.D. Liu, and J. Yeh

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Properties and Processing of Vapor-Deposited Coatings
Editors: Roger N. Johnson, Woo Y. Lee, Michael A. Pickering and Brian W. Sheldon
Frontmatter
[More information](#)

**PART VII: PROPERTIES AND PROCESSING
OF CVD DIAMOND**

***Boron-Doped Diamond Films for Electrochemical Applications 217**
H.B. Martin, B.A. Smith, J.C. Angus, U. Landau, and A.B. Anderson

**Chemical Vapor Deposition of Diamond From Alcohol
Precursors at 1.0 Torr 227**
D.R. Gilbert, R.K. Singh, and M. Huang

**The Characteristics of dc Glow Discharge and its Effects on
Enhancement of Diamond Nucleation in HF-CVD System 233**
Z. Xu, R.J. Narayan, J. Narayan, and J. Sankar

**Nitrogen Defect Concentration in Chemical Vapor Deposited
Homoeptitaxial Diamond at High Temperatures 239**
C.S. Yan and Y.K. Vohra

PART VIII: NOVEL TECHNIQUES

Polymer Multi-Layer Processing of Thin Film Materials 247
*T.A. Miller, M.G. Mikhael, R. Ellwanger, A. Boufelfel, D. Booth,
and A. Yializis*

**CCVD: Low-Cost Vapor-Deposition of Thin Films in Open
Atmosphere 255**
J.J. Schmitt

**Carbon Film Synthesis on the Water by Excimer Laser
Irradiation 261**
H. Hidai and H. Tokura

**The Thermochemical Surface Modification of the
Iron-Carbon Alloys 267**
L.A. Timofeeva, M.V. Dobrotvorskaya, and V.M. Stepanenko

Photochemical Modification of the ZnSe Surface 273
V.M. Stepanenko

**Structure and Strength of Rapidly Quenched Cu-Al₂O₃
Composites 279**
A.I. Il'insky, A.S. Terletsky, and E.W. Zozulya

**Physical Behavior of Fluorine Atoms in the Fabricated
Transparent SiO₂ Thin Film at Room Temperature 283**
H. Iizuka and M. Murahara

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Properties and Processing of Vapor-Deposited Coatings
Editors: Roger N. Johnson, Woo Y. Lee, Michael A. Pickering and Brian W. Sheldon
Frontmatter
[More information](#)

**PART IX: PROPERTIES AND PROCESSING
OF DIAMOND-LIKE CARBON**

*Deposition and Properties of Diamond-Like Carbons	291
<i>J. Robertson</i>	
Micro- and Nano-Mechanical Behavior of Diamond-Like Carbon Containing Foreign Atoms Prepared by Pulsed Laser Deposition	303
<i>Q. Wei, R.J. Narayan, A.K. Sharma, J. Sankar, S. Oktyabrsky, and J. Narayan</i>	
Diamond-Like Nanocomposite Films Fabricated in an Acetylene Atmosphere by Ion Beam Assisted Deposition: XPS Analysis	309
<i>P.W. Wang, J.L. Sulak, X-Z. Ding, F.M. Zhang, and X-H. Liu</i>	
Deposition and Etching of Amorphous Carbon Films Prepared by ECR-Plasma-Enhanced Benzene Chemical Vapor Deposition	315
<i>X-H. Chen, L.M. Tolbert, Z.Y. Ning, and D.W. Hess</i>	
Gas Phase and Surface Kinetics of Diamond-Like Carbon Films Growth in PECVD Reactors	321
<i>M. Masi, C. Cavallotti, and S. Carrà</i>	
Quantitative Analysis of Raman Spectra from Diamond-Like Carbon: Calibration Transfer	327
<i>S.S. Rosenblum, K.L. Davis, and J.M. Tedesco</i>	
Epitaxial Growth of Diamond on an Iridium (100) Substrate by Microwave Plasma-Assisted Chemical Vapor Deposition	333
<i>T. Tsubota, S. Tsuruga, T. Saito, K. Kusakabe, S. Morooka, and H. Maeda</i>	
The Effect of Silicon on Thermal Stability and Wear Behavior of Diamond-Like Carbon Films	339
<i>W-J. Wu and M-H. Hon</i>	
Surface Phenomena of the Thin Diamond-Like Carbon Films	345
<i>V.I. Polyakov, A.I. Rukovishnikov, A.V. Khomich, B.L. Druz, D. Kania, A. Hayes, M.A. Prelas, R.V. Thompson, T.K. Ghosh, and S.K. Loyalka</i>	

**PART X: PROPERTIES AND PROCESSING OF
HARD COATINGS**

*Carbon-Nitride, Diamond-Like-Carbon and Silicon-Based Films Synthesized by Electron Cyclotron Resonance Chemical Vapor Deposition	353
<i>M.B. Moran and L.F. Johnson</i>	

*Invited Paper

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Properties and Processing of Vapor-Deposited Coatings
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Frontmatter
[More information](#)

Low-Temperature Synthesis of Si-C-N and C-N Films by IR-Laser Assisted ECR-PECVD	365
<i>S. Zhu and H.W. White</i>	
Nitrogen Implantation Effects on the Chemical Bonding and Hardness of Boron and Boron Nitride Coatings	371
<i>A. Jankowski, T. Felter, R. Patterson, J. Hayes, S. Anders, T. Stamler, and D. Poker</i>	
Nitrogen-Induced Nanocrystallinity of CVD Diamond Films on Ti-6Al-4V Alloys	377
<i>S.A. Catledge and Y.K. Vohra</i>	
Growth of Diamond on Sapphire by Pulsed Laser Ablation Under Oxygen Atmosphere	383
<i>M. Yoshimoto, Y. Hishitani, H. Maruta, H. Koinuma, T. Tachibana, S. Nishio, and M. Kakihana</i>	
Laser Assisted Deposition of Carbon Nitride Coatings	387
<i>A. Kumar and R. Alexandrescu</i>	
Growth and Erosive Wear Properties of MPCVD Diamond Coatings on Sintered Tungsten Carbide Substrates	395
<i>S. Amirhaghi, H.S. Reehal, R.J.K. Wood, and D.W. Wheeler</i>	
¹³C NMR Spectroscopy of Amorphous Hydrogenated Carbon and Amorphous Hydrogenated Boron Carbide	401
<i>J. Braddock-Wilking, S.H. Lin, and B.J. Feldman</i>	
Functionally Gradient PECVD Ti(C,N) Coatings	407
<i>J. Shieh, H.L. Wang, M.S. Tsai, and M.H. Hon</i>	
Synthesis of Crystalline Structures of CN_x Thin Films Deposited on Sapphire, Quartz and Alumina Substrates	413
<i>R. Alexandrescu, R. Cireasa, A. Crunteanu, C.S. Cojocaru, I. Morjan, A. Kumar, and F. Vasiliu</i>	
Preparation and Characterization of Carbon Nitride Thin Films by Electron Cyclotron Resonance (ECR) Sputtering Method	419
<i>Y. Aoi, Y. Tani, M. Hisa, and E. Kamijo</i>	
Author Index	423
Subject Index	425

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Frontmatter

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PREFACE

Over 100 oral and poster papers were presented at Symposium OO, "Properties and Processing of Vapor-Deposited Coatings," at the 1998 MRS Fall Meeting in Boston, Massachusetts. These papers described leading-edge research efforts associated with generating relevant processing-microstructure-property-performance relationships of coatings produced by chemical vapor deposition (CVD) and physical vapor deposition (PVD) methods. Various coating materials and applications were discussed during three days of the symposium, ranging from producing high-quality diamond coatings to developing large-scale or novel diamond-like carbon (DLC) processes, understanding metal-ceramic interface adhesion behavior in thermal barrier coatings, identifying corrosion-resistant ceramic coating materials for high-temperature structural applications, and preparing polymeric thin films for integrated circuits. Rapid advances in industrial process scale-up were reported.

It was exciting to hear a joint effort by Los Alamos National Laboratory and General Motors to develop a large-scale DLC coating chamber (5' diameter by 15' long), based on a novel process concept called "plasma ion immersion process." On another front, meaningful computational and experimental progress made in understanding the reaction kinetics, particularly gas phase chemistry, of complex CVD processes was discussed.

The importance of understanding the initial nucleation and growth behavior of vapor-deposited materials was demonstrated in many coating systems, notably for diamond growth on Ni and Al₂O₃ substrates. For high-temperature structural applications, the adverse effects of trace impurities, such as sulfur and grain boundaries on the metal-ceramic interface adhesion behavior of thermal barrier coatings, were discussed along with related processing issues. Overall, the symposium clearly showed that (i) vapor-deposited coatings are being actively pursued for diverse technological benefits, and (ii) the coating community is increasingly relying on generating appropriate processing-microstructure-property relationships to guide integrated coating process and product development.

Roger N. Johnson
Woo Y. Lee
Michael A. Pickering
Brian W. Sheldon

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[More information](#)

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Mark D. Allendorf
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Woo Y. Lee
Michael A. Pickering
Brian W. Sheldon

The invited speakers, leaders in the field, expended significant effort in contributing to this volume, and we would like to acknowledge them:

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