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Education

Ph.D. Columbia University, New York, NY, 1973
M.S. Columbia University, New York, NY, 1969
B.A. Queens College, Flushing, NY, 1967

Professional Career

1989-date Distinguished Professor of Physics, NJIT, Newark, NJ
1979-89 Member of Technical Staff, AT&T Bell Laboratories, Murray Hill, NJ
1975-79 Assistant Professor of Physics, Rensselaer Polytechnic Institute, Troy, NY
1973-75 Postdoctoral Fellow, Carnegie-Mellon University, Pittsburgh, PA

Honors and Awards

The Electrochemical Society Thomas D. Callinan Award (1989)
Research & Development Magazine IR 100 Award (1987)
Semiconductor International R&D Achievement Award (1986)
NATO Advanced Study Institute Directorship (1986, 88, 89, 90)
AT&T Bell Laboratories Exceptional Contribution Award (1985, 87, 88, 89)
NATO Advanced Study Institute Fellowship (19977, 1978)
National Science Foundation Fellowship (1973-75)
United States Office of Naval Research Fellowship (1969-71)
Henry Krumb Scholarship (1968)
New York State Scholar Incentive Award (1967-71)
American Men and Women of Science
Who's Who in Technology Today
Sigma Xi

Professional Affiliations

Electrochemical Society: Member of the DS&T Executive Committee
SEMI: Member of the Technical Advisory Committee
Materials Research Society
Member of the NASA New Jersey Space Grant Consortium Advisory Board
Serves on the Civilian Research & Development Foundation Peer Review Board
Serves on the NASA Gossamer Peer Review Board

NJIT Research Activities 1989-present

- Investigation of environmentally friendly substitutes for cadmium and chromium.
- Chemical vapor deposition of thin films using environmentally benign precursors.
- Development of membrane materials for MEMS and aerospace applications.
- Synthesis and characterization of ceramic membranes for VOC separation.
- Design and fabrication of integrated photonic sensors.

- Synthesis and characterization of dielectric (SiO_2 , Si_3N_4 , SiC , BN , DLC) and metal (TiN , Cu , W , Al) thin films.
- Evaluation of non-global warming gases for chamber cleaning/wafer patterning.
- Multi-lifecycle reengineering of CRT glass.

NJIT Graduate Theses

“Synthesis and Characterization of Atmospheric Pressure Chemically Vapor Deposited Aluminum”, Sipeng Gu, Ph.D. in Material Science (2008).

“Synthesis and Characterization of Plasma Enhanced Chemically Vapor Deposited Tantalum Films”, Weizhong Chen, Ph.D. in Physics (2008).

“Modeling of Boron and Phosphorus Implantation of (100) Germanium and Investigation of Dopant Annealing Behavior”, Yong Seok Suh, Ph.D. in Materials Science (2004).

“Fabrication and Characterization of Microcrystalline Silicon Solar Cells”, Liwei Li, Ph.D. in Materials Science (2003).

“Development of An Integrated Photonic Sensor for Monitoring Hazardous Organics”, Dianhong Luo, Ph.D. in Materials Science, (2001).

“Synthesis and Characterization of Low Pressure Chemically Vapor Deposited Boron Nitride and Titanium Nitride Films”, Narahari Ramanuja, Ph.D. in Materials Science (2000).

“Nanoporous SiO_2 /Vycor Membranes for Air Separation”, Mihir Tungare. M.S. in Materials Science (2000).

“Low Pressure Chemical Vapor Deposition of Titanium Nitride: Synthesis and Characterization”, Sameer Dharmadhikari, M.S. in Chemical Engineering (1999).

“Synthesis and Characterization of Silicon Dioxide films Using Diethylsilane and Oxygen”, Kiran Kumar, M.S. in Materials Science (1998).

“Plasma Enhanced Chemical Vapor Deposition Of Diamond Like Carbon Films Using Acetylene”, Sriram Vishwanathan, M.S. in Materials Science (1998).

“Low Pressure Chemical Vapor Deposition of Boron Nitride Thin Films from Triethylamine Borane Complex and Ammonia”, Narahari Ramanuja, M.S. in Materials Science (1997).

“The $\text{In}_{0.75}\text{Ga}_{0.25}\text{As}/\text{In}_{0.52}\text{Al}_{0.48}\text{As}/\text{InP}$ Hall Effect Magnetic Field Sensor”, Oleg Mitrofanov, M.S. in Materials Science (1997).

“Development and Characteristics of Carbon Nitride Thin Solid Films for Advanced Coating Applications”, Muhammad Hussain, M.S in Chemical Engineering (1997).

“Synthesis and Characterization of Phosphosilicate Glass films by LPCVD for Sensor Applications”, Hui Wu, M.S. in Materials Science (1997).

“Synthesis and Characterization of LPCVD Silicon Carbide Films Using Novel Precursors”, Mahalingam Bhaskaran, Ph.D. in Materials Science (1997).

“Low Pressure Chemical Vapor Deposition of SiO₂ on Porous Vycor Tubes for Gas Separation”, Emmanuel Ramos, Ph.D. in Chemistry (1996).

“Microporous Silicon Dioxide /Vycor Membranes for Gas Separation”, Justin Barone, M.S. in Materials Science (1996).

“Trifluoroiodomethane as an Environmentally Friendly Gas for Wafer patterning by Plasma Etching Process”, Krit Aryusook, M.S. in Materials Science (1996).

“Synthesis and Characterization of Silicon Dioxide Thin Films by Low Pressure Chemical Vapor Deposition”, Sutham Niyomwas, M.S. in Materials Science (1996).

“Synthesis and Characterization of Hafnium Carbide Thin Films”, Wiriya Thongruang, M.S. in Materials Science (1996).

“Synthesis and Characterization of Silicon Dioxide Thin Films by Low Pressure Chemical Vapor Deposition Using Ditertiarybutylsilane and Oxygen”, Sung Jun Lee, M.S. in Materials Science (1996).

“Low Pressure Chemical Vapor Deposition of Silicon Dioxide and Phosphosilicate Glass Thin Films”, Vijayalakshmi Venkatesan, M.S. in Materials Science (1996).

“Fabrication of Integrated Optic Sensor to Monitor Pollutant Concentration in Effluents”, Kiran Chatty, M.S. in Materials Science (1996).

“Characterization of Low Pressure Chemically Vapor Deposited Boron Nitride Films as Low Dielectric Constant ILD Materials”, Manish Narayan, M.S. in Engineering Science (1996).

“Plasma Enhanced Chemical Vapor Deposition of Stress Free Tungsten Films”, David Perese, M.S. in Engineering Science (1996).

“Synthesis of Boron Nitride/VYCOR Composite Membrane Structures by an Optimized LPCVD Process”, Ravindranath Chenna, M.S. in Engineering Science (1995).

“Low Pressure Chemical Vapor Deposition of Tungsten for X-ray Lithography Applications”, Hong Yu Chen, M.S. in Engineering Science (1995).

“Low Pressure Chemical Vapor Deposition of Silicon Nitride Films from Trimethyl-aminosilane”, Xin Lin, M.S. in Engineering Science (1995).

“Low Pressure Chemical Vapor Deposition of Copper Films from Cu(I) (HFAC) (TMVS)”, Wei-Shang King, M.S. in Engineering Science (1995).

“Synthesis of Silicon Oxide/VYCOR Composite Membrane Structures by an Optimized LPCVD Process”, Abhijit Datta, M.S. in Engineering Science (1995).

“The Photolithographic Patterning of Porous Silicon using Silicon Nitride and Silicon Carbide Films as Masks”, Hong Wang, M.S. in Engineering Science (1995).

“Synthesis and Characterization of Silicon Dioxide Thin Films by Plasma Enhanced Chemical deposition from Diethylsilane and Nitrous Oxide”, Lan Chen, M.S. in Chemistry (1995).

“Low Pressure Chemical Vapor Deposition of Silicon Nitride Films from Ditertiary-butylsilane”, Xiangqun Fan, M.S. in Engineering Science (1994).

“Laser Treatment of Ceramic Coatings on Defective Ceramic Glazed Tile”, Gousinn Yu, M.S. in Engineering Science (1993).

“Synthesis and Characterization of Silicon Nitride Films Deposited by Plasma Enhanced Chemical Vapor Deposition using Diethylsilane”, Yanyao Yu, M.S. in Engineering Science (1993).

“Synthesis and Characterization of LPCVD Boron Nitride Films for X-Ray Lithography”, Wen-Pin Kuo, M.S. in Engineering Science (1992).

“Low Temperature Synthesis and Characterization of Silicon Dioxide Films by LPCVD Using Diethylsilane”, Chakravarthy S. Gorthy, M.S. in Engineering Science (1992).

“Characterization of LPCVD Deposited Silicon Dioxide Thin Films”, Xue Du, M.S. in Chemistry (1992).

“Synthesis and Characterization of Silicon Nitride Films Deposited by Plasma Enhanced Chemical Vapor Deposition”, Kei Turng Shih, M.S. in Electrical Engineering (1991).

“Low Pressure Chemical Vapor Deposition (LPCVD) of Silicon Carbide from Diethylsilane”, Yi-Tong Shi, M.S. in Chemistry (1991).

“Synthesis and Characterization of Boron Nitride Masks for X-Ray lithography”, Venkat Paturi, M.S. in Electrical Engineering (1991).

“Synthesis and Characterization of LPCVD Silicon Carbide Thin Films for X-Ray Lithography”, Mahalingam Bhaskaran, M.S. in Electrical Engineering (1991).

Sponsored Post-Doctoral Fellows

Sungmin Maeng, Yong S. Suh, Sipeng Gu, Raul J. Martin Palma, Vitaly Sigal, Vladimir Zaitsev, Oktay Gokce, Jose M. Albella, Jan Opyrchal, Eric Mastromatteo.

Consulting

Lawrence Livermore	EPV
ENECO	Rice Systems
IBM	Allied Signal
Motorola	Heraeus Amersil
Olin	Schumacher
Kulite	Nanostructures Inc.
Process Technology Limited	Cypress Semiconductors
EM Industries	Thin Films Concepts
Lucent technologies	Analog Devices
Structured Materials Industries	Sharp Microelectronics
Texas Instruments	Veeco Instruments
Naval Research Laboratory	Mems Optical
Plasmion	Schutz Engineering

Professional Service

- Reviewer for the Journal of The Electrochemical Society, the Journal of Material Science, the Journal of Applied Physics, and the Journal of Non-Crystalline Solids.
- Serves on the National Science Foundation Review Boards.

- Reviewer of NSF, DOE, EPSCOR proposals.
- Member of the Associated Institutions for Material Sciences Advisory Board.
- Member of the NASA New Jersey Space Grant Consortium Advisory Board.

Teaching Activities

Freshman Physics Solid State Physics Modern Physics Materials Science

Curricula Development

Curricula for the following new courses were developed and implemented within the NJIT Materials Science and Engineering program:

Fundamentals of Engineering Materials	Mechanical Properties of Materials
Composite Materials	Introduction to Ceramics
Glass Science and Engineering	Thermodynamics of Solids
Transport of Electrons and Phonons in Solids	Physical Metallurgy
Diffusion and Solid State Kinetics	Crystallography and Diffraction
Science and Technology of Thin Films	Defects in Solids
Materials Characterization	Materials Science and Engineering

Funded Programs:

“Investigation of Chemically Vapor Deposited Tantalum for Medium Caliber Gun Barrel Protection”, Strategic Environmental Research and Development Program, February 2005 to January 2008 (\$1,500,000).

“Investigation of Chemically Vapor Deposited Aluminum as a Replacement Coating for Cadmium”, Strategic Environmental Research and Development Program, September 2004 to August 2007 (\$1,500,000).

“Microcrystalline Silicon Photovoltaic devices”, Department of Energy, May 2000 to April 2003 (\$600,000).

“An Integrated Near Infrared Spectroscopy Sensor for In-situ Environmental Monitoring”, U. S. Environmental Protection Agency, March 1998 to February 2001 (\$551,570).

“Multi-lifecycle engineering of CRT Glass”, New Jersey Commission on Science and Technology, January 1998 to December 1999 (\$128,000).

“An Integrated Evanescent Wave Absorbance Sensor for In-situ Monitoring and process Control Leading to Reduction of Hazardous Emissions”, U. S. Army, October 1997 to September 1999 (\$235,000).

“Design And Characterization of Ceramic Membrane Modules for VOC Separation”, NJIT Hazardous Substance Management Research Center, July 1997 to June 1998 (\$61,861).

“An Integrated Optical Sensor for Environmental Monitoring”, NJIT Hazardous Substance Management Research Center, July 1996 to June 1997 (\$36,000).

“Design And Characterization of Ceramic Membrane Modules for VOC Separation”, NJIT Hazardous Substance Management Research Center, July 1996 to June 1997 (\$64,000).

“Synthesis and Characterization of Carbon Nitride Films”, New Jersey Space Grant Consortium, August 1995 to August 1996 (\$25,000).

“Microsensor for Monitoring Volatile Organics from Thermoplastics Using Pulsed Terahertz Spectroscopy”, Center for Manufacturing Systems, July 1995 to June 1996 (\$20,000).

“An Integrated Optical Sensor for Environmental Monitoring”, Hazardous Substance Management Research Center, June 1995 to June 1997 (\$102,000).

“Novel Ceramic Membranes for VOC Separation”, Emission Reduction Research Center, July 1994 to June 1995 (\$81,000).

“Synthesis and Characterization of Ceramic Membranes for VOC Separation”, Hazardous Substance Management Research Center, July 1994 to June 1996 (\$160,000).

“Synthesis and Characterization of Silicon Carbide Membranes for X-Ray Lithography”, ARPA, October 1992 to September 1995, (\$290,000).

“Micromechanical Characterization of Ceramic Coatings”, NASA New Jersey Space Grant Consortium, September 1992 to August 1993 (\$25,000).

“Plasma Enhanced Chemical Vapor Deposition of Silicon Nitride from Di-t-butylsilane”, Center for Manufacturing Systems, September 1992 to August 1993 (\$25,000).

“Novel Ceramic Membranes for VOC Separation”, Air Emission Reduction Center, January 1992 to June 1993 (\$210,833).

“Silicon Carbide films for Aerospace Applications”, NASA New Jersey Space Grant Consortium, September 1991 to August 1992 (\$24,899).

“Synthesis and Characterization of SiC and BN Films for Microengineering Structures”, Advanced Technology Center on Surface Engineered Materials, June 1991 to May 1992 (\$14,295).

“Microelectronic Deposition Processes Based on safe Substitutes for Hazardous Precursors”, Hazardous Substance Management Research Center, September 1990 to August 1991 (\$72,034).

“Synthesis and Characterization of Boron Nitride Masks for X-Ray lithography”, NSF, August 1990 to July 1992 (\$88,168).

“Fabrication of Thin Film Phosphors for High Performance Cathode Ray Tubes”, Center for Manufacturing Systems, July 1990 to June 1991 (\$8,000).

“Synthesis and Characterization of Silicon Carbide and Oxide Films”, Research Corporation, May 1990 to August 1991 (\$22,500).

“A Boron Nitride Mask manufacturing for X-Ray Lithography”, Center for Manufacturing Systems, March 1990 to June 1991 (\$37,500).

Industrial Experience - AT&T Bell Laboratories 1979-89

- Direct participation in all aspects of VLSI fabrication as related to the development of the 2.5 μm and 1.25 μm TWIN-TUB CMOS-technology
- Process tailoring of all major IC operations.

- Initiation of novel LPCVD processes for dielectric insulation, as well as gate, contact, and interconnect metallization.
- Implementation of advanced materials and processes in IC device manufacturing.
- Application of diagnostic techniques for characterization of materials and analysis of circuit structures.
- Assessment of materials performance as pertaining to device yield and reliability.
- Development of new mask fabrication technologies for submicron x-ray lithography.
- Design and Processing of integrated photonic circuits on silicon.
- Development of new applications for high T_c superconductors.

Academic Experience - CMU and RPI 1973-79

- Investigation of the structure of silicate glasses with a variety of diagnostic techniques including Mossbauer spectroscopy, electron paramagnetic resonance, and x-ray diffraction.
- Characterization of the structure and electrical properties of amorphous alloys at cryogenic temperatures.
- Evaluation of the magnetic and electrical properties of Pd-Ag-Fe alloys and correlation with theoretical models.
- Industrial consulting with local industries has resulted in research finding of the following projects:
 - Solar Energy Converters
 - Lead Shot Replacement
 - Magnetic Bubbles
 - Light Modulation by Thin Films
 - Triggering Mechanisms for Photoresists
 - Thermodynamics for Lighting
 - Powder Metallurgy of Composites
 - Acousto-Optic Bulk Waves
 - Ceramic Forming Processes
 - Investigation of Phase Separation in a Lead Borosilicate Glass

RPI Teaching Activities

Freshman-Sophomore Physics	Experimental Physics I and II
Applied Solid State Physics	Special Projects in Physics
Advanced Solid State Physics	Materials I
Materials and Processes	
Principles and Applications of Mossbauer Effect Spectroscopy	

RPI Departmental Committees

- Chairman, Solid State Seminar (1976-1977)
- Member of Undergraduate Majors Committee (1976-1977)
- Member of Qualifying Exam Committee (1977-1978)
- Radiation Safety Officer (1975-1978)
- French Language Examiner (1975-1978)

RPI Consulting

GTE Laboratories	Lawrence Berkeley Laboratories
Watervliet Arsenal	Mechanical Technologies Inc.
Xerox Corporation	IBM

RRC International
General Electric

Combustion Engineering

Books

“Materials and Processes for Submicron Technologies”, Elsevier, New York, (1999).

“Novel Silicon Based Technologies”, Kluwer Academic Publishers, Boston, Massachusetts (1991).

“Reduced Thermal Processing for ULSI”, Plenum Publishing Corporation, New York (1989).

“Microelectronic Materials and Processes”, Kluwer Academic Publisher, Boston, Massachusetts (1989).

“Multilevel Metallization and Packaging”, The Electrochemical Society, Pennington, New Jersey (1985).

“Electrical Magnetic and Optical Properties of Glasses”, North-Holland Publishing Company, New York (1980).

“Amorphous Magnetism II”, Plenum Publishing Corporation, New York (1977).

Videotapes

Novel Silicon Based Technologies (1991)

This video course production covers the following topics: Gallium Arsenide Heteropitaxial Growth on Silicon, Device Applications of Epitaxial Gallium Arsenide on Silicon, Ion Beam Synthesis in Silicon, Ion Beam Processing of CVD Silicon Layers, Technology and Devices for Silicon Based Three-Dimensional Circuits, Integrated Fabrication of Micromechanical Structures on Silicon, Micromachining of Silicon for Sensor Devices, Preparation and Properties of High Temperature Superconductors, Integrated Photonic Circuits on Silicon, Principles and Implementation of Artificial Neural Networks.

Reduced Thermal Processing for ULSI (1989)

This video course production covers the following topics: RTP with Reactive Gases, Silicidation by RTA, Microstructural Defects in RTP IC Materials, RTP Systems, RTP Integration, Laser Pantography, Ion Beam Assisted Processing, Micrometallization Technologies, Multilevel Interconnect Structures, Interlevel Dielectrics for RTP, CVD of Metals and Low Temperature Silicon Epitaxy.

Microelectronic Materials and Processes (1987)

This video course production covers the following topics: Crystal Growth, Epitaxy, Silicon Oxidation, Physical Vapor Deposition, Chemical Vapor Deposition, Dielectrics, Silicides for VBI Applications, Resist Materials, Fine-Line lithography, Dry Etching Processes, Ion Implantation, Diffusion in Semiconductors, Interconnect Materials, Imperfections and Impurities in Semiconductors, Process Simulation, Diagnostic Techniques for Microelectronic Materials, and Packaging.

Satellite Course

Advanced Materials and Processing for the ULSI Era (1991)

This satellite course production covers the following topics: High-Speed, High-Performance Devices, Thin Films for Future Generation ICs, Submicron Lithographic Technologies, ULSI Process Integration, Advanced Plasma Processes, Microelectronic Packaging Technologies for Leading-Edge Consumer Electronics Products.

Publications

X.Q. Yi, K. Su, E. Schlam, and R. A. Levy, "Electrostatic Flexible Film Based Smart Window; Optical design, Performance and Residual Charge Investigation", *Sol. Energy*, **110**, 67 (2014).

X. Q. Yi and R. A. Levy, "Electrical Breakdown Mechanism in Contaminated Polyimide Coating", *Emer. Mater. Res.* **4**, 1 (2014).

Y. Suh, W. Chen, S. Maeng, S. Gu, R. A. Levy, H. Thridandam, "Synthesis and Characterization of Plasma Assisted Chemically Vapor Deposited Tantalum", submitted to *J. of Surface and Coatings Technology* (2009).

S. Gu, S. Maeng, R. A. Levy, and Y. Suh, "Investigation of Atmospheric Pressure Chemically Vapor Deposited Aluminum Coatings for Corrosion Protection", submitted to *J. of Surface and Coatings Technology* (2009).

Y. Suh, W. Chen, S. Maeng, R. Levy, H. Thridandam, K. Cuthill, T. Gaffney, "Investigation of Plasma Enhanced Chemically Vapor Deposited Tantalum on High Strength Steels", *Materials Science and Technology 2007 Conference Proceedings*, pp 563-572 (2007).

S. Maeng, S. Gu, R. Levy, F. Gomez, S. Newberg, D. Deavenport, E. Brooman, E. Berman, J. Beatty, "Synthesis and Characterization of Atmospheric Pressure Chemically Vapor Deposited Aluminum", *Materials Science and Technology 2007 Conference Proceedings*, pp 67-77 (2007).

Y. S. Suh, M. S. Carroll, R. A. Levy, G. Bisognin, D. De Salvador, and M. A. Sahiner, "Implantation and Activation of High Concentrations of Boron and Phosphorus in Germanium", *Mater. Res. Soc. Symp. Proc.*, Vol. 891, 891 (2006).

M. S. Carroll, Y. S. Suh, and R. A. Levy, "Suppressed Boron Diffusion in Bulk Silicon below Strained (100) $\text{Si}_{1-x}\text{Ge}_x$ Surfaces during Nitrogen Annealing", *Proc. of the Electrochem. Soc.* Vol. 501, 675 (2006).

M. S. Carroll, Y. S. Suh, and R. A. Levy, "Suppressed Boron Diffusion in Bulk Silicon below Strained (100) $\text{Si}_{1-x}\text{Ge}_x$ Surfaces during Nitrogen Annealing", to appear in *Conference Proceedings of the Electrochemical Society* (2005).

Y. M. Li, L. Li, J. A. Anna Selvan, A. E. Delahoy, and R. A. Levy, "Effects of Seeding Methods on the Fabrication of Microcrystalline Silicon Solar Cells using Radio Frequency Plasma Enhanced Chemical Vapor Deposition", *Thin Solid Films*, vol. **483**, 84 (2005).

Y. S. Suh, M. S. Carroll, R. A. Levy, M. A. Sahiner, G. Bisognin, and C. A. King, "Modeling of Boron and Phosphorus Implantation into (100) Germanium", *IEEE Trans. Electron Devices*, vol. **52**, 91 (2005).

Y. S. Suh, R. A. Levy, M. S. Carroll, and A. Sahiner, "Phosphorus and Boron Implantation into (100) Germanium", *Mater. Res. Soc. Symp. Proc.*, vol. **809**, B8.11.1 (2004).

- L. Li, Y. M. Li, J. A. Anna Selvan, A. E. Delahoy, and R. A. Levy, "Correlations between Structural Properties and Performance of Microcrystalline Silicon Solar Cells Fabricated by Conventional RF-PECVD", *J. Non-Cryst. Solids* **347**, 106 (2004).
- Y. M. Li, J. A. Anna Selvan, L. Li, R. A. Levy, and A. E. Delahoy, "A Study of Single chamber RF-PECVD μ -Si Solar Cells", *Proceedings of the Third World Conference on Photovoltaic Energy Conversion*, Osaka, Japan, 1788 (2003).
- L. Li, Y. M. Li, J. A. Anna Selvan, A. E. Delahoy, and R. A. Levy, "Structural Characterizations of Microcrystalline Silicon Solar Cells Fabricated by Conventional RF-PECVD", *Mater. Res. Soc. Symp. Proc.*, vol. **762**, A5.15.1 (2003).
- D. H. Luo, R. A. Levy, Y. F. Hor, and J. F. Federici, and R. M. Pafchek, "An Integrated Photonic Sensor for In-situ Monitoring of Hazardous Organics", *Sens. & Actuators B* **92**, 121 (2003).
- N. Ramanuja, R. A. Levy, S. N. Dharmadhikari, E. Ramos, C. W. Pearce, S. C. Menasian, P. C. Schamberger, and C. C. Collins, "Synthesis and Characterization of Low Pressure Chemically Vapor Deposited Titanium Nitride Films Using $TiCl_4$ and NH_3 ", *Mater. Lett.*, **57**, 261 (2002).
- R. A. Levy, L. Chen, J. M. Grow, and Y. Yu, "Plasma Enhanced Chemical Vapor Deposition Of Si-O-H And Si-N-C-H Films Using The Environmentally Benign Precursor Diethylsilane", *Mater. Lett.*, **54**, 102 (2002).
- R. J. Martin-Palma, J. M. Martinez-Duart, L. Li, and R. A. Levy, "Electrical Behavior of Double-Sided Metal/Porous Silicon Structures for Optoelectronic Devices", *Mater. Sci. Eng. C* **19**, 359 (2002).
- A. Avila, I. Montero, L. Galán, J. M. Ripalda, J. M. Martinez-Duart, and R. A. Levy, "Silicon Carbide Thin Films obtained by Chemical Vapor Deposition: An XPS Study", *J. of Applied Physics*, **89**, 212 (2001).
- N. M. Ravindra, F. M. Tong, D. Pattnaik, D. Ivanov, R. A. Levy, K. Aryusook, and V. Patel, "Silicon Microlenses for IR Image Sensors", *Proc. SPIE*, Santa Clara, CA, vol. **3511**, 152 (1998).
- R. A. Levy, V. B. Zaitsev, K. Aryusook, C. Ravindranath, V. Sigal, A. Misra, S. Kesari, D. Ruffin, J. Sees, and L. Hall, "Investigation of CF_3I as an Environmentally Benign Dielectric Etchant", *J. Mater. Res.*, **13**, 2643 (1998).
- A. Misra, J. Sees, L. Hall, R. A. Levy, V. B. Zaitsev, K. Aryusook, C. Ravindranath, V. Sigal, S. Kesari, and D. Ruffin, "Plasma Etching of dielectric Films Using the Non-Global -Warming gas CF_3I ", *Mater. Lett.*, **34**, 415 (1998).
- L. Vazquez, R. C. Salvarezza, E. Albano, A. J. Arvia, A. H. Creus, R. A. Levy, and J. M. Albella, "Surface Morphology Evolution of Chemical vapor Deposited Tungsten Films on Si(100)", *Chem. Vap. Deposition* **4**, 89 (1998).
- S. Gilles, N. Bourhila, J. P. Senateur, R. Madar, R. A. Levy, and E. Blanquet, "Deposition of Ti(C,N) Thick Films by ILPCVD Starting from TDMAT", *Proc. Mater. Res. Soc.*, Boston, MA, vol. **495**, 177 (1998).
- R. A. Levy, C. Ravindranath, L. N. Krasnoperov, J. Opyrchal, and E. S. Ramos, "Porous Vycor Membranes Modified by Chemical Vapor Deposition of Boron Nitride for Gas Separation", *J. Electrochem. Soc.*, **144**, 349 (1997).

- R. A. Levy, E. S. Ramos, L. N. Krasnoperov, A. Datta, and J. M. Grow, "Nanoporous SiO₂/Vycor Membranes for Gas Separation", *J. Mater. Res.* **11**, 3164 (1996).
- R. A. Levy, X. Lin, J. M. Grow, H. J. Boeglin, and R. Shalvoy, "Low Pressure Chemical Vapor Deposition of Silicon Nitride Using the Environmentally Friendly Tris(dimethylamino)silane Precursor", *J. Mater. Res.*, **11**, 1483 (1996).
- L. Vasquez, J. M. Albella, A. J. Arvia, R. C. Salvarezza, R. A. Levy, and D. Perese. "Roughening Kinetics of Chemical Vapor Deposited Copper Films on Si(100)", *Appl. Phys. Lett.*, **68**, 1285 (1996).
- R. A. Levy, J. M. Grow, Y. Yu, and K. T. Shih, "Plasma Enhanced Chemical Vapor Deposition of Si-N-C-H Films from Environmentally Benign Organosilanes", *Mater. Lett.*, **24**, 47 (1995).
- J. M. Grow, R. A. Levy, X. Fan, and M. Bhaskaran, "Growth Kinetics and Characterization of Low Pressure Chemically Vapor Deposited Si₃N₄ Films from (C₄H₉)₂SiH₂ and NH₃", *Mater. Lett.*, **23**, 187 (1995).
- H. Wang, B. Welker, Y. Gao, J. F. Federici, and R. A. Levy, "Photolithographic Patterning of Porous Silicon Using Silicon Nitride and Silicon Carbide Masks", *Mater. Lett.*, **23**, 209 (1995).
- R. A. Levy and J. M. Grow, "Improved Tools for Microelectronic Processes", *NJIT Research*, vol. **3**, 17 (1995).
- R. A. Levy, E. Mastromatteo, J. M. Grow, V. Paturi, W. P. Kuo, H. J. Boeglin, and R. Shalvoy, "Low Pressure Chemical Vapor Deposition of B-N-C-H Films from Triethylamine Borane Complex", *J. Mater. Res.*, **10**, 320 (1995).
- R. A. Levy, J. M. Grow, Y. Yu, and K. T. Shih, "Plasma Enhanced Chemical Vapor Deposition of Silicon Nitride from Novel Organosilanes", in "Materials and Processes for Environmental Protection", *Materials Research Society Symposium Proceedings*, Vol. **344**, Pittsburgh, PA (1994).
- J. M. Grow and R. A. Levy, "Micromechanical Characterization of Chemically Vapor Deposited Ceramic Films", *J. Mater. Res.*, **9**, 2072 (1994).
- R. A. Levy, J. M. Grow, and C. S. Chakravarthy, "Low Temperature Synthesis and Characterization of Silicon Dioxide Films", *Chem. Mater.*, **5**, 1710 (1993).
- R. A. Levy and J. M. Grow, "LPCVD of Silicon carbide from the Organosilanes Diethylsilane and Di-*t*-butylsilane", in "Material Aspects of X-ray Lithography", Eds. G. K. Celler and J. R. Maldonado, *Materials Research Society Symposium Proceedings*, Vol. **306**, pp. 219-228, Pittsburgh, PA (1993).
- J. M. Grow, R. A. Levy, M. Bhaskaran, H. J. Boeglin, and R. Shalvoy, "Low Pressure Chemical Vapor Deposition of Silicon Carbide from Diteriarybutylsilane", *J. Electrochem. Soc.*, **140**, 3001 (1993).
- R. A. Levy and J. M. Grow, "Growth Kinetics and Properties of Dielectric Films Synthesized from Diethylsilane", *Mater. Sci. & Eng.*, **B17**, 172 (1993).
- J. M. Grow, R. A. Levy, Y. T. Shi, and R. L. Pfeffer, "Low Pressure Chemical Vapor Deposition of Silicon Carbide Using Diethylsilane", *J. Electrochem. Soc.*, **140**, 851 (1993).

"Novel Silicon Based Technologies", Ed. by R.A. Levy, Kluwer Academic Publishers, Dordrecht, The Netherlands (1991).

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"Investigation of Plasma Enhanced Chemically Vapor Deposited Tantalum on High Strength Steels", Materials Science and Technology 2007 Conference and Exhibition, Detroit, MI (2007).

"Synthesis and Characterization of Atmospheric Pressure Chemically Vapor Deposited Aluminum", Materials Science and Technology 2007 Conference and Exhibition, Detroit, MI (2007).

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Patents

“Chemical Vapor Deposition of Aluminum on an Activated Surface”.

“Deposition of Phosphorus - Containing Silicate Glass Layers in Device Manufacture”.

“Conductive Via Plug for CMOS Devices”.

“Method for Fabricating Devices and Devices Formed hereby with Selective Tungsten”.

“Contact Vias in Semiconductor Devices Subjected to Reflow”.

“Device Fabrication by X-Ray Lithography Using Stable Boron Nitride Mask”.

“Triggerable Superconductive Switching Means and Apparatus Comprising the Means”.

“Semiconductor Devices Having Superconducting Interconnects”.

“Integrated Optical Waveguide by Chemical Vapor Deposition”.

“Subnanoscale Composite, N_2 -Permselective Membrane for the Separation of Volatile Organic Compounds”.