GERALD B. STRINGFELLOW

**Distinguished Professor Materials Science and Engineering and Electrical and Computer Engineering**

**Member of the *National Academy of Engineering***

January 1, 2021

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University of Utah

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Education

1964 B.S., Ceramic Engineering, University of Utah, Salt Lake City

1965 M.S., Materials Science, Stanford University, Stanford, California

1967 Ph.D., Materials Science, Stanford University, Stanford, Calif.

Thesis: "Photoelectric Properties of ZnSe"

Advisor: R. H. Bube

Professional Experience

1998-2003: Dean, College of Engineering, University of Utah

1996-present: Distinguished Professor of Materials Science and Engineering,

University of Utah

1980-1996: Professor

1982-85, 1994-1998: Chairman

1996-present: Distinguished Professor of Electrical and Computer Engineering,

University of Utah

1980-1996: Professor

1986-2015: Adjunct Professor of Physics, University of Utah

1986-1990: Director, Microelectronics Center, University of Utah

1989-1998: Director, Center for Advanced Materials, University of Utah

1998: Sabbatical, Kyoto University

Sabbatical, University of California, Berkeley

1990: Sabbatical, Clarendon Laboratory, Department of Physics,

University of Oxford, Oxford, U.K.

1967-1980: Hewlett Packard Laboratories, Palo Alto, California

1970-1980: Project Manager

1967-1970: Member of Technical Staff

1979: Sabbatical, Max-Planck Institute, Stuttgart, Germany

Honors, Awards, Distinctions, etc.

National Academy of Engineering Member, February 2001.

Member of peer committee: 2002-2005.

Nominee: Chair of Materials Section, 2008.

Rosenblatt Prize: University of Utah, May 2004.

Frank Prize, International Organization on Crystal Growth, August 2016.

International Conference on MOVPE, Career Achievement Award, May 2010.

John Bardeen Award of TMS, March 2003.

Pioneers of Progress Award, State of Utah, July 2007.

The American Association for Crystal Growth Crystal Growth Award, August 1999.

>20,000 citations to printed technical books and papers (h index = 72)

Web of Science ranked “Microstructures produced during the epitaxial growth of InGaN alloys”

143 in the category Crystallography papers published between 2010 to 2014.

Principal Editor, Journal of Crystal Growth, 1998-2003

Editor, Journal of Crystal Growth, 1993-present

Associate Editor, Journal of Crystal Growth, 1979-1993

Governor’s Medal for Science and Technology Award, 1997

Distinguished Professor, University of Utah - Awarded May 1996

Alexander von Humboldt U.S. Senior Scientist Award, 1979

Life Fellow of The Institute of Electrical and Electronics Engineers (IEEE), 1989

Member EU Academy of Sciences, 2018-present.

Paper Selected for Inclusion in “A Perspective on Crystal Growth”, An Historical

Collection of 25 Papers in Celebration of 25 Years of the Journal of Crystal

Growth, 1992.

Japanese Society for the Promotion of Science Fellow, February 1998.

Guest Fellow of The Royal Society, February - June, 1990

Distinguished Research Award, University of Utah, June 1989

*Who’s Who Lifetime Award* 2017.

Listed in *Who’s Who in America* since 1992.

Listed in *Who’s Who in The World since 1992* .

2017 - 2019 Albert Nelson Marquis Lifetime Achievement Award

1995-1998: Secretary, International Organization of Crystal Growth

2004-2010: Member of Executive Committee, International Organization

of Crystal Growth

2007: Co-Chairman, ICCG, ICVGE, and OMVPE Workshop, Salt Lake City,

Utah, July 2007

1985-87: Chairman, Electronic Materials Committee

1979-1999: Editorial Board, Journal of Electronic Materials

1992-1998: Letters Editor, Journal of Electronic Materials

1995-present: International Editorial Advisory Board, Advanced Materials CVD

1996-present: Advisory Board (member), Materials Science Forum, series of books

published by Trans Tech Publications, Zurich

1996-present: Editorial Advisory Board, Current Topics in Crystal Growth

Research.

1989-1994 Editorial Board, Materials Letters

1979-83: Editorial Board, Progress in Crystal Growth and

Characterization

2018-present: Editorial Board, Academic Journal of Engineering Sciences

1986, 1988, 1991: Students Selected for Annual Outstanding Paper Award --

Outstanding Paper, with a Student First Author, Published in the Journal of

Electronic Materials that Year.

Professional Activities

Member: IEEE (life fellow), American Physical Society, Materials Research Society.

2020: Organizing Committee Member, Global Conference on Nano Electronics and

Advanced Computer Applications, Luxembourg, November 16-17, 2020.

2020: Committee Member, Advanced Functional Materials Congress, Sweden, 23-25

March, 2020.

2019: Session Organizer, International Conference on Growth and Epitaxy, Keystone, Co,

July 2019

2019: Organizing Committee Member for 21st World Congress on Materials Science and

Engineering, Taipei, May 27-28, 2019.

2018: International Advisory Committee, , International Conference on ICMOVPE, Nagoya,

Japan, July 2018.

2016: International Advisory Committee, , International Conference on ICMOVPE, San Diego,

July 2016.

2016: International Advisory Committee, International Conference on Crystal Growth and

Epitaxy – 18, Japan, 2016.

2014: International Advisory Committee, International Conference on ICMOVPE, Switzerland,

July 2014.

2013: International Advisory Committee, 17th International Conference on Crystal Growth and

Epitaxy, Warsaw Poland, 11-16 August 2013.

2012: International Advisory Committee, International Conference on ICMOVPE, Korea,

June 2012.

2010: International Advisory Committee, International Conference on ICMOVPE, Lake Tahoe,

Nevada, May 2010.

2009: International Advisory Board, EUROCVD, Vienna, Austria, October 4-9, 2009.

2008: International Advisory Committee, International Conference on MOVPE,

Metz, France, June 2008.

2007: Chair, International Conference on Crystal Growth, Salt Lake City, July 2007

2007: International Advisory Committee, Fifth International Conference on Solid State Crystals,

Zakopane, Poland, May 2007

2006: International Advisory Committee, International Conference on MOVPE, Miyazaki, Japan.

2004: International Advisor Committee, International Conference on MOVPE, Maui.

2003-2006: Peer Committee – National Academy of Engineering – Materials Engineering

2003: Co-organizer, Symposium on Self-Organized Processes in Semiconductor Epitaxy,

Boston, November 2003.

2002: International Advisory Committee, International Conference on MOVPE,

Berlin, Germany, June 2002.

2000: Program Committee, International Symposium on Compound Semiconductors,

Monterey, CA, October 2000.

2000: International Steering Committee, International Conference on MOVPE, Japan,

2000.

2000-2003, Board of Trustees of the Utah Information Technology Association.

2000 Awards co-chairman, American Crystal Growth Conference, Vail, August

2000.

1999: International Steering Committee, 26th International Symposium on Compound

Semiconductors, Berlin, August 1999.

1999: Organizing Committee, Ninth U.S. OMVPE Workshop, May, 1999, Ponte

Vedra Beach, Florida

1999: International Advisory Committee, Seventh International Conference on

Chemical Beam Epitaxy and Related Growth Techniques, July 1999.

1998: International Advisory Committee, Twelfth International Conference on

Crystal Growth, Jerusalem, July 1998.

1998: International Advisory Committee, Ninth International Conference on

MOVPE, LaJolla, June 1998.

1997: International Advisory Committee, Fourth International Symposium on

Atomically Controlled Surfaces and Interfaces, Tokyo, October 1997.

1997: International Programme Committee for the 6th International Conference

on Chemical Beam Epitaxy, Lausanne, September 1997.

1997: Organizing Committee, International Symposium on Compound

Semiconductors, San Diego, September 1997.

1997: Program Committee, 8th International Conference on Modulated

Semiconductor Structures, July 28-Aug 1, 1997, Santa Barbara, Calif.

1997: Organizing Committee, Eighth U.S. OMVPE Workshop, April 1997,

Dana Point, CA.

1996: Review Panel - Materials Science Division of Lawrence Berkeley

Laboratory, September, 1996.

1996: International Advisory Committee, International Conference on MOVPE

(Number Eight), Cardiff, Wales, June 9-13.

1995: International Advisory Committee, 3rd International Symposium on Atomically

Controlled Surfaces and Interfaces, Raleigh, North Carolina, October 1995.

1995: International Advisory Committee, 5th International Conference on Chemical

Beam Epitaxy, LaJolla, California, June 1995.

1995: Co-Organizer, US/Japan Workshop on Atomic-Scale Mechanisms of

Epitaxial Growth, Honolulu, Hawaii, May 1995.

1995: Organizing Committee, Seventh U.S. OMVPE Workshop, April, 1995.

1995: Program Committee, International Conference on Narrow Gap

Semiconductors, Santa Fe, January 1995.

1994: Program Committee, 21st International Symposium on Compound

Semiconductors, San Diego, September 19, 1994.

1994: International Advisory Committee, 8th International Conference on Vapor

Growth and Epitaxy, Freiburg, Germany, 24-29 July, 1994.

1994: International Advisory Committee, 7th International Conference on Metal

Organic Vapor Phase Epitaxy, Yokohama, Japan, 31 May-3 June, 1994.

1993: International Advisory Committee, 4th International Conference on Chemical

Beam Epitaxy and Related Growth Techniques, Nara, Japan, July, 1993.

1993: Organizing Committee, Sixth U.S. OMVPE Workshop, April, 1993.

1993: Co-organizer, Focussed Session on Order/Disorder Phenomena in

Semiconductors, American Physical Society Meeting, March 1993.

1992: Program Committee, 19th International Symposium on GaAs and Related

Compounds, Karuizawa, Japan, September 28, 1992.

1992: Program Committee, 10th International Conference on Crystal Growth,

San Diego, CA, August 16-22, 1992.

1992: Organizing Committee and Proceedings Chairman, 6th

International Conference on MOVPE, Boston, June 1992.

1991: Treasurer: American Committee Organizing Committee for the International

Symposium on GaAs and Related Compounds.

1991: International Advisory Committee, First International Symposium on

Atomically Controlled Surfaces and Interfaces, Tokyo, Japan, November, 1991.

1991: Program Chairman, International Symposium on GaAs and Related

Compounds, Seattle, September, 1991.

1991: International Advisory Board, International Conference on Vapor

Growth and Epitaxy, Nagoya, Japan, July, 1991.

1991: International Advisory Committee, 3rd International Conference on

Chemical Beam Epitaxy, University of Oxford, 1-5 September, 1991.

1990: Organizing/Program Committee, First International Conference on

Epitaxial Crystal Growth, Budapest Hungary, April, 1990.

1990: International Advisory Committee, 5th International Conference

on MOVPE, Aachen, Germany, June 1990.

1989: Organizing Committee, US Workshop on OMVPE, September 1989,

California

1989: International Advisory Committee, 2nd International Conference on

CBE, Houston, December 1989.

1988: Co-organizer, Joint US/Japan Workshop on Alloy Semiconductor

Physics and Electronics, October 1988, Hawaii

1988: International Advisor, Fourth International Conference on Metal-

Organic Vapor Phase Epitaxy, Hakkone, Japan.

1986-87: National Research Council Committee on Process Challenges

in Compound Semiconductors, member.

1986: Member, Organizing Committee, Third International Conference

on MOVPE, Universal City, California, April, 1986.

1986-1998: Member, American Organizing Committee for International

Symposia on GaAs and Related Compounds.

1983-85: Program Chairman, Electronic Materials Conference

1985-present: Executive Committee, American Association for Crystal

Growth

1984: International Advisor, Second International Conference on Metal-

Organic Vapor Phase Epitaxy, Sheffield, England.

1982: International Advisory Committee, Member, International

Conference on Epitaxial Growth of Semiconductors, Perpignan,

France.

1981: Program Committee Member, International Conference on Vapor

Growth and Epitaxy, San Diego.

1981: International Advisory Committee, 1st International Conference on

Metalorganic Vapor Phase Epitaxy, Corsica, France.

1980-1981: Expert (Special Consultant) to NASA.

1978-82: Member, Electrochemical Society Awards Committee.

1978: Program Committee Member, IEDM, Washington, D.C.

1978: Program Committee Member, International Symposium on GaAs

and Related Compounds, St. Louis, MO.

1978-1995: Member Electronic Materials Committee of A.I.M.E.

Books Written

*Organometallic Vapor Phase Epitaxy: Theory and Practice,* Chinese Language Edition (Peking University Publishing Company), 2016.

*Organometallic Vapor Phase Epitaxy: Theory and Practice,* Second Edition (Academic Press, Boston), 1999.

*High Brightness Light Emitting Diodes*, Co-editors G.B. Stringfellow and M. G. Craford, (Academic Press, Boston), 1997.

*Phase Equilibria Diagrams (Semiconductors and Chalcogenides),* G.B. Stringfellow, General Editor (The American Ceramic Society, Westerville, Ohio, 1992)

*Organometallic Vapor Phase Epitaxy: Theory and Practice* (Academic Press, Boston, 1989).

Books and Proceedings Edited

*Metalorganic Vapor Phase Epitaxy - 2004*  ed. G.B. Stringfellow and R.M. Biefeld, (North Holland, Amsterdam, 2004).

*Self-Organized Processes in Semiconductor Heteroepitaxy****,*** ed. A.G. Norman, R.S. Goldman, R. Noetzel, and G.B. Stringfellow (Materials Research Society Symposium Proceedings, Volume 794 (2004).

*Metalorganic Vapor Phase Epitaxy - 1998*  ed. G.B. Stringfellow and R.M. Biefeld, (North Holland, Amsterdam, 1998).

*Growth and Characterization of Nitride Semiconductors*, Co-editors C. Abernathy and G.B. Stringfellow (Elsevier, Amsterdam, 1997).

*Ordered Structures in Semiconductors*, Special Issue of Materials Research Society Bulletin, July 1997.

*International Conference on Vapor Growth and Epitaxy: Proceedings* (Elsevier, Amsterdam, 1997).

*Atomic Scale Mechanisms of Epitaxial Growth*, ed. G.B. Stringfellow and T. Nishinaga, (Elsevier, Amsterdam, 1996).

*Metalorganic Vapor Phase Epitaxy - 1992*  ed. G.B. Stringfellow and J.J. Coleman, (North Holland, Amsterdam, 1992).

*GaAs and Related Compounds - 1991*, ed. G.B. Stringfellow, Institute of Physics Conference Series Number 120 (Institute of Physics, Bristol, 1992).

*Alloy Semiconductor Physics and Electronics* (ed. G.B. Stringfellow and A. Sasaki) (Elsevier, Amsterdam, 1989).

*American Crystal Growth - 1987* (ed. G.B. Stringfellow), (North Holland ,Amsterdam, 1987).

*Metalorganic Vapor Phase Epitaxy - 1986* (ed. G.B. Stringfellow), (North Holland, Amsterdam, 1986).

*American Crystal Growth / Vapor Growth and Epitaxy - 1984* (ed. M. Schieber, D.W. Shaw, and G.B. Stringfellow), (North Holland, Amsterdam, 1984).

*IEEE Transactions on Electron Devices, Special Issue on Displays and LEDs* (G.B. Stringfellow, Guest Editor, IEEE, 1979).

Patents

G.B. Stringfellow and H.T. Hall, Method for Vapor Epitaxial Deposition of III/V Materials Utilizing Organometallic Compounds and a Halogen or Halide in a Hot Wall System, #4,147,571, April 3, 1979.

G.B. Stringfellow, A.D. Howard, and D.C. Chapman “Use of Surfactants to Control Unintentional Dopants in Semiconductors” (disclosure October 2007, under revision to address examiner comments).

F. Liu, G.B. Stringfellow, and J. Zhu, METHODS FOR ENHANCING P-TYPE DOPING IN III-V SEMICONDUCTOR FILMS U-4296 (Accepted, May 2017).

F. Liu, G.B. Stringfellow, and X. Niu, Quantum Dot and Nanowire Synthesis Allowed by Patent Office, June 2018.

G.B. Stringfellow, F. Liu, and J. Merrill, Use of Surfactants to control island size, island density, and In incorporation in thin InGaN layers grown by OMVPE US 9,735,008 (August 15, 2017)

Publications(Reviewed papers and chapters in books)

396 total

H index = 72 (Google Scholar)

>20,000 total citations

Epitaxial Growth of Metastable Semiconductor Alloys, Journal of Crystal Growth, accepted for publication January 2021.

Fundamentals of MOVPE Growth, in Metalorganic Vapor Phase Epitaxy (MOVPE): Growth, Materials Properties and Applications, ed. S.J. Irvine and P. Capper (Wiley, UK) (2019) (INVITED)

Thermodynamics of III-V and III-Nitride Alloys, Journal of Japanese Association for Crystal Growth, Special Issue “Basic Theory of Epitaxy”, 43 (2016) 28. (Invited)

Thermodynamic considerations for epitaxial growth of III/V alloys, J. Cryst Gr. 468 (2017) 11. (plenary paper presented Aug. 8, 2016, Nagoya, Japan, Frank Prize Lecture) (Invited)

Effect of surfactant Sb on In incorporation and island size in thin InGaN layers grown by organometallic vapor phase epitaxy, (with J. Merrill and F. Liu) J. Cryst. Gr. 375, 90-94 (2013).

Simulation of self-assembled compositional core-shell structures in InGaN nanowires, (with X. Niu, Y.J. Lee, and F. Liu) Phys. Rev. B 85, 165316 (2012)

Phase Separation in Strained Epitaxial InGaN islands, (with X. Niu and F. Liu) Appl. Phys. Lett. 99, 213102 (2011).

Quantum Stress Exerted by Extrinsic Electronic Pressure in Nanofilms and Solids, (with F. Liu, J. Zhu, D. Wu, Z.F. Wang, Y. Han, M. Liu, and Z. Liu), Proceedings of the National Academy of Science (submitted).

Nonequilibrium composition profiles of alloy quantum dots and their correlation with the growth mode, Phys. Rev. Lett. (with X. Niu and F. Liu) 107, 076101 (2011).

Use of nanostructures for high brightness LEDs, invited chapter in, Energy Efficiency and Renewable Energy through Nanotechnology, Ed. L. Zang, Springer, Berlin, 803-843 (2011).

Strain-Enhanced Doping in Semiconductors: Effects of Dopant Size and Charge State, (with J. Zhu, F. Liu, and S.H. Wei) Phys. Rev. Lett. 105. 195503 (2010).

Microstructures Produced During the Epitaxial Growth of InGaN Alloys, J. Crystal Growth, 312, 735 (2010).

Dopant Induced Electronic Stress and Strain Enhanced Doping, Phys Rev B, (with J.Y. Zhu, S.H. Wei, and Feng Liu), (accepted) (paper presented at 2010 March APS meeting).

Enhanced cation-substituted p-type doping in GaP from dual-surfactant effects, J. Cryst. Gr. (with J.Y. Zhu and Feng Liu), 312 174-179 (2010).

Dual-Surfactant effect to enhance Zn-doping in III-V Semiconductor Thin Films (with J.Y. Zhu and Feng Liu), Phys. Rev. Lett. 101, 196103 (2008).

Modulated Contrast and Associated Diffracted Intensity of GaPSb layers grown by OMVPE (with T.Y. Seong, B.R. Booker, A.G. Norman, and F. Glas), J. Korean Phys. Soc. 52, 471 (2008).

Effects of surfactant N on Zn, C, and H doping of GaP, (with A.D. Howard), J. Crystal Growth 310, 2702 (2008).

Ordered domain structures of nitrogen-doped GaInP layers grown by OMVPE (with B.J. Kim, Y.W. Ok, T.Y. Seong, and D.C. Chapman), Journal of Materials Science: Materials in Electronics, 1-5 (2007)

Fundamentals of Vapor Phase Epitaxial Growth Processes, in Perspectives on Inorganic, Organic, and Biological Crystal Growth: From Fundamentals to Applications, ed. M. Skowronski, J. DeYoreo, and C. A. Wang, American Institute of Physics, New York, 2007, pp 48-68.

Chemical beam epitaxial growth of InP and GaP by using tertiarybutyl-bis (dimethylamino) phosphine (with H. Ryu, C.R. Kim, J. Lee, J.Y. Leem, and L.P. Sadwick), J. Korean Phys. Soc., 51, 2051 (2007)

Effects of Low Surfactant Sb Coverage on Zn and C Incorporation in GaP, (with A.D. Howard) J. Appl. Phys. 102, 074920 (2007).

Effects of surfactants Sb and Bi on the incorporation of Zinc and Carbon in III/V materials grown by OMVPE(with A.D. Howard and D.C. Chapman), J. Appl. Phys. 100, 44904 (2006).

Zn enhancement during surfactant mediated growth of GaInP and GaP(with D.C. Chapman and A.D. Howard), J. Crystal Growth 287, 647 (2006).

Chemical beam epitaxial growth of GaInP using uncracked trisdimethylaminophosphine (with H.H. Ryu, M.H. Jeon, J.Y. Leem, H.J. Song and L.P. Sadwick), J. Materials Science 41 (24) (2006).

Nitrogen surfactant effects in GaInP (with D.C. Chapman, A. Bell, F. Ponce, J. Lee, T. Seong, S. Shibakawa, and A. Sasaki), J. Appl. Phys. 96, 7229 (2004).

Te surfactant effects on the morphology of patterned (001) GaAs homoepitaxy, (with R.R. Wixom and L.W. Rieth), J. Crystal Growth 269,276 (2004).

Thermodynamics of Modern Epitaxial Growth Processes, in Crystal Growth – From Fundamentals to Technology, ed. G. Muller, J.J. Metois, and P. Rudolph (Elsevier, Amsterdam, 2004) pp. 1-26.

Effects of Surfactants N and Br on Ordering in GaInP (with D.C. Chapman, A.D. Howard, L. Rieth, R.R. Wixom, and G.B. Stringfellow), Materials Research Society Proceedings Vol. 794, p. 291 (2004).

Sb surfactant effects on homeo-epitaxy of GaAs (001) patterned substrates (with R.R. Wixom and L.W. Rieth), J. Crystal Growth 265, 367 (2004).

The Use of Nitrogen to disorder GaInP (with D.C. Chapman, L.W. Rieth, J.W. Lee, and T.Y. Seong), J. Appl. Phys. 95, 6145 (2004).

Effects of Br and Cl on Organometallic Vapor Phase Epitaxial Growth and Ordering in GaInP (with A.D. Howard, L. Rieth, D.C. Chapman, R.R. Wixom, B.J. Kim, and T.Y. Seong)J. Appl. Phys. 95, 2319 (2004).

Development and Current Status of OMVPE, J. Crystal Growth 264, 620 (2004).

Chemical beam epitaxial growth of GaInP using uncracked trisdimethylaminophosphine (with H.H. Ryu and L.P. Sadwick), J. Materials Science (submitted).

Use of Surfactants in Organometallic Vapor Phase Epitaxy (with D.C. Chapman, R.R. Wixom, B.J. Kim, and T.Y. Seong), Chemical Vapor Deposition XVI, (The Electrochemical Society, Pennington, NJ), pp. 286-298 (2003).

Theory of Sb-surfactant covered reconstructions on InP (001) and GaP (001) (with R.R. Wixom and N.A. Modine), Phys. Rev. B 67 115309 (2003).

Theory of Sb induced triple period ordering in GaInP (with R.R. Wixom and N.A. Modine), Phys. Rev. B – Rapid Communications 64, 201322 (2001).

Influence of Sb, Bi, Tl, and B on the incorporation of N in GaAs (with F. Dimroth, A. Howard, and J.K. Shurtleff), J. Appl. Phys. 91, 3687 (2002).

Kinetics of Te doping in disordering GaInP grown by organometallic vapor phase epitaxy (with S.W. Jun, A. Howard, C.M. Fetzer, and J.K. Shurtleff), Journal of Applied Physics 90, 6048 (2001).

Isoelectronic surfactant-induced surface step structure and correlation with ordering in GaInP (with S.W. Jun, J.K. Shurtleff, and R.T. Lee), Journal of Applied Physics (accepted, 2001).

The effect of surfactant Sb on carrier lifetime in GaInP epilayers (with C.M. Feter, R.T. Lee, X.Q. Liu, A. Sasaki, and N. Ohno) J. Appl. Phys. 91, 199 (2001).

Time dependent surfactant effects on growth of GaInP heterostructures by organometallic vapor phase epitaxy, (with J.K. Shurtleff, R.T. Lee, C.M. Fetzer, S. Lee, and T.Y. Seong), Journal of Crystal Growth 234, 327 (2002).

Surfactant Effects on Doping of GaAs Grown by Organometallic Vapor Phase Epitaxy (with J.K. Shurtleff and S.W. Jun) Applied Physics Letters 78, 3038 (2001).

Spectroscopic study of surfactant enhanced OMVPE growth of GaInP (with C.M. Fetzer, R.T. Lee, and D.C. Chapman), J. Appl. Phys. 90, 1040 (2001).

Enhancement of compositional modulation in GaInP epilayers by the addition of surfactants during OMVPE growth (with R.T. Lee, C.M. Fetzer, S.W. Jun, D.C. Chapman, J.K. Shurtleff, Y.W. Ok and T.Y. Seong), J. Crystal Growth 233, 490 (2001).

Sb enhancement of lateral superlattice formation in GaInP (with C.M. Fetzer, R.T. Lee, S.W. Jun, S.M. Lee, and T.Y. Seong), Appl. Phys. Lett. 78, 1367 ( 2001).

Ordering dependence of carrier lifetimes and ordered states of GaInP/GaAs with degree of order < 0.64, (with A. Sasaki, K. Tsuchida, X.Q. Liu, N. Ohno. Y. Narukawa, Y. Kawakami, S. Fujita, Y. Hsu, and C. Fetzer), Proceedings of the International Symposium on Compound Semiconductors (IEEE, New York) pp. 103-108 (2001).

Adsorption and desorption of the surfactant Sb on GaInP grown by organometallic vapor phase epitaxy (with J.K. Shurtleff and R.T. Lee ) Proceedings of the International Symposium on Compound Semiconductors (IEEE, New York) pp. 197-203 (2001).

Surface Processes in OMVPE – the Frontiers (with J.K. Shurtleff, R.T. Lee, C.M. Fetzer, and S.W. Jun), J. Crystal Growth 221, 1 (2000). Invited paper-MOVPE-10.

Bi surfactant control of ordering and surface structure in GaInP grown by organometallic vapor phase epitaxy (with S.W. Jun, R.T. Lee, C.M. Fetzer, J.K. Shurtleff, C.J. Choi, and T.Y. Seong), J. Appl. Phys. 88, 4429 (2000).

Ordering Dependence of Carrier Lifetimes of GaInP/GaAs with S≤0.55 (with A. Sasaki, K. Tsuchida, Y. Narukawa, Y. Kawakami, S. Fujita, and Y. Hsu, J. Appl. Phys. 89, 343 (2001).

Effects of Si doping on ordering and domain structures in GaInP (with S.M. Lee, T.Y. Seong, and R.T. Lee) Applied Surface Science 158, 223 (2000).

Isoelectronic dopant induced ordering transition in GaInP grown by OMVPE (with T.Y. Seong, S.M. Lee, and R.T. Lee), Surface Science Letters 457, L381 (2000).

Bi Surfactant Effects on Ordering in GaInP Grown by OMVPE (with S.W. Jun, C.M. Fetzer, R.T. Lee, and J.K. Shurtleff), Appl. Phys. Lett.76, 2716 (2000).

The Use of Surfactant Sb to Induce Triple Period Ordering in GaInP (with C.M. Fetzer, R.T. Lee, J.K. Shurtleff, and T.Y. Seong), Appl. Phys. Lett. 76, 1440 (2000).

Surfactant Effects on Ordering in GaInP Grown by OMVPE, (with C.M. Fetzer, R.T. Lee, S.W. Jun, and J.K. Shurtleff), Materials Research Society Proceedings, Vol. 583, 201 (2000) (Invited Paper).

Surfactant Controlled Growth of GaInP by OMVPE, (with R.T. Lee, J.K. Shurtleff, C.M. Fetzer, S. Lee, and T.Y. Seong), J. Appl. Phys. 87, 3730 (2000).

Effects of the Surface on CuPt Ordering in GaInP, in Spontaneous Ordering in Semiconductor Alloys, ed A. Mascareneus, (Kluwer Academic/Plenum Press, New York, 2002) Chapter 3.

Heterostructures in GaInP grown using a change in Te doping, (with Y. Hsu, C.M. Fetzer, J.K. Shurtleff, C.J. Choi, and T.Y. Seong, J. Appl. Phys. 87, 7776 (2000).

Bandgap Control in GaInP Using Surfactant Sb (with K. Shurtleff, R.T. Lee, and C.M. Fetzer), Appl. Phys. Lett. 75, 1914 (1999).

Effects of Dopants on Ordering in GaInP (with R.T. Lee, C.M. Fetzer, K. Shurtleff, Y.Hsu, and T.Y. Seong), J. Electron. Mater. 29, 134 (2000).

Effects of Te doping on ordering and antiphase boundaries in GaInP (with C.J. Choi, T.Y. Spirydon, T.Y. Seong, and S.H. Lee), Japan. J. Appl. Phys. 39, 402 (2000).

Step Structure and Ordering in Zn-doped GaInP (with S.H. Lee, C.M. Fetzer, C.J. Choi, and T.Y. Seong), J. Appl. Phys. 86, 1982 (1999).

Pyrolysis of 1,1 Dimethylhydrazine for OMVPE (with R.T. Lee), J. Electron. Mater. 28, 963 (1999).

Te Doping of GaInP - Ordering and Step Structure (with S.H. Lee, C.M. Fetzer, D.H. Lee, and T.Y. Seong), J. Appl. Phys. 85, 3590 (1999).

Quantum Wells Due to Ordering in GaInP (with Y. Hsu, C.E. Inglefield, J.H. Cho, M.C. DeLong, P.C. Taylor, and T.Y. Seong), Appl. Phys. Lett. 73, 3905 (1998).

Ordering Dependence of GaInP Recombination Lifetime (with K. Tsuchida, A. Sasaki, Y. Narukawa, Y. Kawakami, T. Tokuda, S. Noda, S. Fujita, and Y. Hsu), Proceedings of Electronic Symposium of Japan (1998).

Pyrolysis of Monomethylhydrazine for OMVPE Growth (with R.T. Lee), J. Crystal Growth 204, 247 (1999).

Influence of Te doping on step bunching of GaAs (001) vicinal surfaces grown by OMVPE (with S.H. Lee), Appl. Phys. Lett. 73, 1703 (1998).

Effect of Te Doping on Surface Structure and Ordering in GaInP (with S.H. Lee and C.M. Fetzer), J. Crystal Growth 195, 13 (1998).

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Electronic Processes in the Photocrystallization of Vitreous Se (with J. Dresner), J. Phys. Chem. Solids **29**, 303 (1968).

Effect of Impurities on the Strength of Polycrystalline Magnesia and Alumina (with J.J. Rasmussen, I.B. Cutler, and S.D. Brown) J. Amer. Ceram. Soc. **48**, 196 (1965).

Invited Presentations

*Plenary Presentations:*

Thermodynamic considerations for epitaxial growth of III/V alloys, OMVPE Workshop, AACG National Meeting, Santa Fe, July 31, 2017 (Plenary Lecture)

Thermodynamic considerations for epitaxial growth of III/V alloys, International Conference on Crystal Growth and Epitaxy, Nagoya, Japan, August 2016 (Frank Prize Plenary Lecture)

Present Status and Future Challenges in OMVPE, International Conference on MOVPE,

Japan, 2000. (Plenary)

Thermodynamic Aspects of Epitaxy, American Conference on Crystal Growth, Arizona, August, 1999. (ACCG Award Lecture)

Fundamentals of Thin Film Growth, American Conference on Crystal Growth, Baltimore, 1-6 August, 1993.(Plenary)

New Sources for OMVPE, 10th Symposium on Alloy Semiconductor Physics and Electronics, July 18-19, 1991, Nagoya, Japan (Plenary).

Fundamental Aspects of Vapor Growth and Epitaxy, 7th International Conference on Vapor Growth and Epitaxy, July 15-17, 1991, Nagoya, Japan (Plenary).

OMVPE: History, status, and future, American Conference on Crystal Growth, Seattle, August, 2002 (Plenary).

*Other Invited Presentations:*

Introduction, Michael Schieber Memorial Session, ICCGE, Keystone, Co July 2019.

Thermodynamic considerations for epitaxial growth of III/V alloys, American Conference on Crystal Growth and Epitaxy, Santa Fe, July 2017.

Thermodynamic Limits on III/V Alloys for Novel Heterostructures Used in LED and Solar Cell Devices, MS&T ’16 Semiconductor Heterostructures, Salt Lake City, October, 2016.

Fundamentals of Vapor Phase Epitaxial Growth Processes, ISSCG, Park City, Ut, August, 2007.

Fundamentals of OMVPE, American Crystal Growth Conference, Big Sky, Montana, July 2005.

Thermodynamics of Modern Epitaxial Growth Processes, International Conference on Crystal Growth Summer School, Berlin, August 2004.

Use of Surfactants in Organometallic Vapor Phase Epitaxy, (with D.C. Chapman, R.R. Wixom, B.J. Kim, and T.Y. Seong), CVD-XVI, Paris, April, 2003.

Control of Nano- and Micro-Scale Inhomogeneities Using Surfactants in III/V Alloys (with C.M. Fetzer, and R.T. Lee) Conference on Electrical Transport and Optical Properties of Inhomogeneous Media, Snow Bird, July 2002.

Manufacturing and Materials: Panel Moderator, Technology to Market Horizons Conference, Park City, September 2001.

The Use of Surfactants to Produce Heterostructures by OMVPE, Workshop on Optical Characterization of Semiconductor Interfaces During Growth: Status and Opportunities, Park City, October 2000.

Surface Processes in OMVPE, Electronic Materials Conference, Denver, June 2000.

Surface Effects on Ordering in GaInP, Materials Research Society, Fall Meeting, Boston, Mass, November 1999.

OMVPE Growth of Semiconductor Materials, American Conference on Crystal Growth, Tuscon, July 1999.

Nitride Alloy Solubility, Materials Research Society, Fall Meeting, Boston, Mass, November 1996.

Atomic Force Microscopy Studies of the Morphology of GaInP Layers Grown by OMVPE, The Metallurgical Society, Anaheim, CA, February 1996.

Spatial mapping of ordered and disordered domains of GaInP by Near-field Scanning Optical Microscopy and Scanning Capacitance Microscopy (with J.K. Leong, J. McMurray, and C.C. Williams, talk delivered by Prof. Williams), Physics of Compound Semiconductor Interfaces, LaJolla, CA, January 1996.

OMVPE Growth of Order/Disorder Heterostructures, Materials Research Society, Boston, December 1995.

Novel Organometallic Precursors for the Chemical Beam Epitaxial Growth of InP Based Semiconductor Materials (with R.W. Gedridge and L.P. Sadwick, paper presented by R.W. Gedridge), 5th International Conference on Chemical Beam Epitaxy and Related Growth Techniques, La Jolla, CA, August 14-16, 1995.

Surface Structure and Ordering During OMVPE, Joint US/Japan Workshop on Atomic Scale Processes During Epitaxial Growth, May 1995, Honolulu.

Ordering Mechanisms in GaInP Grown by OMVPE, Gordon Research Conference, June 1994.

OMVPE Growth of III/V Alloys Using Novel Antimony Precursors, Workshop on Antimonide Materials Chemistry and Growth, February 28-March 1, 1994, Austin Texas.

Surface Processes in OMVPE, Materials Research Society Spring Meeting, San Francisco, April 12-16, 1993.

OMVPE for Photovoltaic Applications, Workshop on Photovoltaic Materials: Innovations and Fundamental Research Opportunities, Vail, CO, July 27-29, 1992.

Novel Precursors for Organometallic Vapor Phase Epitaxy, 10th International Conference on Crystal Growth, San Diego, CA, August 16-22, 1992.

Organometallic Vapor Phase Epitaxy, International Crystal Growth Summer School, Palm Springs, CA, August 9-14, 1992.

Thermodynamic & Kinetic Aspects of III-V Epitaxy, Croissance de cristaux et de couches epitaxiales a applications electroniques et optiques, Valais, Switzerland, March 15-21, 1992.

Comparison of Epitaxial Techniques for III-V Layer Structures, Croissance de cristaux et de couches epitaxiales a applications electroniques et optiques, Valais, Switzerland, March 15-21, 1992.

CVD Growth With Novel Precursors, 1992 Gordon Research Conference, The Chemistry of Electronic Materials, Ventura, CA, 2-6 March 1992.

Naturally Occurring Superlattices in III/V Alloys, International Workshop on Optical Properties of Mesoscopic Semiconductor Structures”, 23-26 April, 1991, Snowbird, Utah.

Ordering in Alloys, 18th Conference on the Physics of Compound Semiconductor Interfaces, January, 1991, Long Beach, CA.

Reactions Occurring During OMVPE of III/V Semiconductors, 200th American Chemical Society National Meeting, Washington, D.C., August 26-31, 1990.

Effect of Strain on OMVPE Growth of III/V Semiconductors, NATO Advanced Research Workshop on Condensed Systems of Low Dimensionality, Marmaris, Turkey, April 23-27, 1990.

Mechanistic Studies of Organometallic Vapor Phase Epitaxy, 1st International Conference on Epitaxial Crystal Growth, Budapest, Hungary, April 1990.

Alternate Sources and Growth Chemistry, International Conference on Chemical Beam Epitaxy and Related Growth Techniques, Hoston, December 1989.

Ordering Structures in Alloys Prepared by OMVPE, Materials Research Society Fall Meeting, Boston, November 1989.

Alternate Group V Sources for OMVPE, American Institute of Chemical Engineers 1989 Annual Meeting, San Francisco, November 1989.

Ordered Structures in Alloys Grown by OMVPE, Electronic Materials Conference, Boston, June 1989.

Reaction Mechanisms for OMVPE Growth of III/V Semiconductors, American Association for Crystal Growth, Western Regional Meeting, Lake Tahoe, California, June 1989.

Alternative Group V Sources for OMVPE, Materials Research Society Meeting, San Diego, April, 1989.

Epitaxial Growth of Metastable Structures, American Physical Society Meeting, St. Louis, March, 1989.

OMVPE for Metastable Alloys and Natural and Artificially Structured Materials, Workshop on Materials Scienceof Epitaxial Heterostructures, Monterey, Ca, January 9-14, 1989.

Ordered Structures and Metastable Alloys Grown by OMVPE, Joint US/Japan Seminar on Alloy Semiconductor Physics and Electronics, Hawaii, October 1988.

Reaction Mechanisms in MOVPE Growth of GaAs and InP Determined Using D2 Labelling, European Workshop on MOVPE and NATO Workshop on Mechanisms of Reactions of Organometallic Compounds with Surfaces, St. Andrews, Scotland, June 1988.

OMVPE Growth of GaInAs/InP Quantum Well Structures, Materials Research Society, Boston, December 1987.

Epitaxial Crystal Growth of III-V Semiconductors, III-V Semiconductor Materials and Devices, Sunnyvale, CA, November 9-11, 1987.

Miscibility Gaps and Ordering in III/V Alloys, Workshop on the Physical and Mechanical Properties of Alloys: Semiconductors and Beyond, Dayton, September, 1987.

Non-hydride OMVPE Growth of III/V Compounds, Third Biennial OMVPE Workshop, Cape Cod, September, 1987.

Technologies Based on OMVPE, NATO International School of Crystallography, Eurice Italy, September, 1987.

Recent Advances in OMVPE Growth of III/V Semiconductors, Sandia National Laboratory, May 1987.

Recent Advances in OMVPE Growth of III/V Semiconductors, American Vacuum Society, Santa Fe, New Mexico, May 1987.

Reactions in OMVPE Growth of InP, Materials Research Society, Anaheim Ca, April 1987.

OMVPE Reaction Mechanisms, Gordon Research Conference, Santa Barbara California, Feb. 23, 1987.

Epitaxial Growth, III/V Semiconductor Materials and Devices, a Short Course sponsored by the University of California at Berkeley, Palo Alto, CA, January 12, 1987.

Thermodynamic Aspects of VPE, International Crystal Growth Summer School, Edinburgh, Scotland, July 6-11, 1986.

Epitaxial Growth, III/V Semiconductor Materials and Devices, a Short Course sponsored by the University of California at Berkeley, Palo Alto, CA, June 1986.

Organometallic Vapor Phase Epitaxy, Electronic Materials Symposium, Palo Alto, CA, March 24, 1986.

OMPVE: Thermodynamics, Kinetics and Mechanisms, Engineering Foundation Conference on III/V Semiconductor Processing, Santa Barbara, CA February 1986.

Epitaxial Growth, III/V Semiconductor Materials and Devices, a Short Course sponsored by the University of California at Berkeley, Palo Alto, CA, October 1985.

OMVPE Growth of In Containing Alloys, International Symposium on Gallium Arsenide and Related Compounds, Karuizawa, Japan, September 1985.

III/V Phase Diagrams, ASM Seminar: Advances in Electronic Materials, Detroit, September 1984.

Thermodynamic Aspects of OMVPE, International Conference on Vapor Growth and Epitaxy, Atlantic City, July 1984.

A Critical Appraisal of Growth Mechanisms in MOVPE, 2nd International Conference on MOVPE, Sheffield, England, April 1984.

Theoretical Aspects of MOVPE, Residential School: MOCVD: Theory and Practice, Queen Mary College, London, March 1984.

Practical MOVPE Growth of III/V Semiconductors, Residential School: MOCVD: Theory and Practice, Queen Mary College, London, March 1984.

Fundamental Comparison of OMVPE with MBE for III/V Alloys, 1st International Workshop on Future Electron Devices, Tokyo, February 1984.

Immiscibility and Spinodal Decompositon in III/V Alloys, 7th International Conference on Crystal Growth, Stuttgart, Germany, September 1983.

Vapor Phase Epitaxial Growth of III/V Semiconductors, 5th International Crystal Growth School, Davos, Switzerland, September 1983.

Miscibility Gaps in III/V Alloy Systems, Electrochemical Society Meeting, San Francisco, CA, May 1983.

Thermodynamics of Organometallic Epitaxy, International Conference on Epitaxial Growth of Semiconductors, Perpignan, France, August 1982.

Thermodynamic Aspects of OMPVE, Gordon Research Conference, Plymouth, New Hampshire, July 1982 (conference lead-off talk).

OMVPE Growth of AlGaAs, SPIE Conference on Semiconductor Growth Technology, Los Angeles, CA, January 1982.

OMVPE Growth of AlGaAs, International Conference on MOVPE, Ajaccio, France, May 1981.

LPE of III/V Semiconductors, International Summer School on Crystal Growth, Durham, New Hampshire, July 1977.

III/V Materials for Microwave Applications, ARPA-MRC Meeting on Epitaxy, La Jolla, CA, July 1976.

Thermodynamic Aspects of VPE Growth of III/V Semiconductors, American Chemical Society Meeting, San Francisco, August 1976.

Calculation of Quaternary III/V Phase Diagrams, Electrochemical Society Meeting, San Francisco, CA, May 1974.

Thermodynamic Considerations in III/V Ternary Compound Synthesis, IEEE Symposium on the Technology and Applications of Liquid Phase Epitaxy, Hoboken, New Jersey, December 1972.

Calculation of Phase Diagrams of Group IV and III/V Semiconductor Systems, Midwinter Solid-State Research Conference, Anaheim, CA, January 1971.

Technical Grants and Contracts

Only grants and contracts from outside the University are included.

AGENCY TITLE DATES AWARD

1. D.O.E. Theoretical and Experimental 4/1/81- $2,600,000

Study of Solid Phase Miscibility 3/31/08

Gaps in III/V Quaternary Alloys

(now in 18th of 21 years continuous

support)

2. A.R.O. Organometallic Vapor Phase 7/18/82- $241,752

Epitaxial Growth of GaInAs 7/17/85

3. General Organometallic Vapor Phase 9/1/81- $339,102

Instrument Epitaxial Growth of AlGaInP 8/31/85

Inc.

4. Charles The Use of Surface Analytical 9/1/83- $70,000

Evans & Techniques to Elucidate Semi- 8/31/86

Associates conductor Crystal Growth

5. Sperry HEMFET 10/31/84- $277,000

(Unisys) ( R. Huber-co-PI) 10/31/87

6. American New Organometallic 3/17/85- $77,682

Cyanamid Phosphorus Sources 3/17/88

Corp

7. NASA Characterization of Vapors 1/1/86- $127,000

Related to OMVPE of AlGaInP 3/31/89

8. General Organometallic Vapor Phase 11/1/86 $500,000

Instrument Epitaxy Reactor (reactor value)

9. Utah Microelectronics Center of 5/1/87- $244,080

State Excellence 6/30/90

10. AFOSR Use of D2 to Elucidate OMVPE 6/15/87- $371,508

Growth Mechanisms 9/30/93

11. General OMVPE Growth of GaAsP and 7/1/87- $92,110

Instrument GaInAsP for Visible LEDs 6/30/88

12. NSF Multilayer Heteroepitaxial Devices 7/1/87- $214,531

(co-PI with Prepared with Wide Energy Gap 6/30/90

C. Casey) Semiconductors

13. SDIO New Group V Sources for OMVPE 10/1/87- $19,177

(subcontract)Growth of InP and GaAs 4/30/88

14. ONR OMVPE Growth of InAsSbBi for 2/1/88- $710,940

/NRL 12 µm Detectors 12/31/94

15. NSF Seminar: Alloy Semiconductor 3/1/88- $11,280

Physics and Electronics 2/28/89

16. Utah Advanced Materials Center of 7/89- $520,000

Excellence 7/92

17. Sarnoff GaInAsSb for 3-5µm Lasers 8/89- $33,000

Laboratories and Detectors 8/90

18. ATM Precursors for Carbon-Free 12/89- $10,000

(subcontract) AlGaAs 3/90

19. ARO New Precursors for CBE 6/91- $411,000

12/95

20. NSF Effects of Surface Structure on 6/94- $600,000

Ordering in III/V Systems 6/01

21. ONR Support for International Sympsoium 8/1/94- $10,000

on Compound Semiconductors 7/31/95

22. NSF Workshop: Atomic-Scale 12/1/94- $15,000

Mechanisms of Epitaxial Growth 11/30/95

23. KAPL OMVPE Growth of Sb-Based 7/1/95- $111,674

III/V Materials 6/30/96

24. NSF Equipment to upgrade Microfabrication 7/1/95- $2,166,829

Facility for Research and Teaching 6/30/00

(co-P.I. with R.J. Huber and R.A. Norman)

25. ARPA Development of New Precursors for 2/1/96- $141,442

for the OMVPE Growth of GaN and 1/31/98

InGaN

26. DOE Next Generation Solar Cells - 1/1/96- $10,000

(Glue Money - co- PI, C. Taylor) 12/31/96

27. Tecstar B Doping of GaInAs for Solar Cells 7/1/99- $45,059

12/31/99

28. Tecstar Addition of N to GaP Grown by 8/1/00- $40,000

OMVPE for High Brightness LEDs 11/1/00

29. Cao Ass. Theoretical Study of AlGaInN for 6/1/06- $50,000

Green and Red LEDs 5/30/07

30. Cao Ass. Use of spinodal decomposition for 3/1/09- $50,000

the improvement of 2/28/10

blue and white LEDs

31. Cao Ass. InGaN green LEDs 2/1/11 $120,000

1/31/12

University Service Activities (partial list)

Dean, College of Engineering, 1998-2003

Gar Cutler Selection Committee, 2019

5 year post-tenure review committee, 2019

Chair, Research Vice President Search Committee (2008)

Co-Chair, USTAR Nano/Bio Hiring Committee

USTAR Building Committee

Director, Micro and Nano Electronics Laboratory, University of Utah, 2005-2009

Chairman, Materials Science & Engineering Department, 1994-1998

Chairman, Materials Science & Engineering Department, 1982-1985

University Research Committee, 1984-87

Chairman, 1986-87

Academic Senate, 1992-1995

Personnel and Elections Committee, 1992-1995

Graduate Students Supervised

C.C. Hsu PhD, EE Summer, 1985

C.P. Kuo PhD, EE Summer, 1985

V. Mark ME, EE Summer, 1987

M.J. Cherng PhD, MSE Winter, 1987

K. Yoon PhD, EE Summer, 1988

N. I. Buchan PhD, EE Summer, 1988

D. R. Bosley ME, EE Summer 1988

T.Y. Cherng PhD, MSE September, 1988

C. A. Larsen PhD, MSE Winter, 1988

J. Dunn PhD, MSE Spring, 1989

H.R. Jen PhD, MSE Autumn, 1989

K. Fry PhD, MSE Winter, 1990

C.H. Chen PhD, Physics Winter, 1990

T.Y. Wang PhD, MSE Summer, 1990

M.J. Jou PhD, MSE Summer, 1990

E. Reilen PhD, EE Summer, 1990

Y.W. Ma PhD, MSE Winter, 1992

S.H. Li PhD, MSE Summer, 1991

D.S. Cao PhD, MSE Summer, 1991

D.H. Jaw PhD, EE Spring, 1992

G.S. Chen PhD, MSE Autumn, 1991

M. Banish PhD, MSE Winter, 1992

Chris Hill PhD, MSE Spring, 1996

L.C. Su PhD, MSE Winter, 1995

K.T. Huang PhD, MSE Summer, 1995

Y.S. Chun PhD,MSE Winter, 1997

J. Shin PhD,MSE Summer, 1996

H. Murata PhD, MSE Spring, 1997

I.H. Ho PhD, EE Spring 1997

T.C.Hsu PhD, MSE Autumn 1998.

Yu Hsu PhD, MSE Spring 2000

S.H. Lee PhD, MSE Autumn 1998.

Zhixiang Liu MS, MSE 1997.

R.T. Lee PhD, MSE Autumn 2000

S.W. Jun PhD, MSE Fall 2001

C.M. Fetzer PhD, MSE Spring 2001.

Sang Hwui Lee MS, MSE New in 1998

David Chapman PhD, MSE 2004

Steven Hurst ME, MSE 2001.

Ryan Wixom PhD, MSE 2004

Alex Howard PhD, MSE 2007

Junyi Zhu PhD, MSE 2009

Kathy Anderson MS, MSE 2011

Post Doctoral Fellows and Visitors

R.M. Cohen University of Utah 1982

J.S. Yuan Jilin, China 1983-1986

M. Kitamura NEC, Tokyo, Japan 1986

A. Persson Erickson, Sweden 1988-89

D. Berkedahl TechnicalUniversity of 1989

Denmark

N. Buchan University of Utah 1988

C. Larsen University of Utah 1989

C.H. Chen University of Utah 1989-1992

D. Drobeck University of Utah 1990-1993

N. Kobayashi NTT, Tokyo, Japan 1993-94

Y. Hosokawa Showa Denko K.K. 1994-95

L.C. Su University of Utah 1995-96

Prof. A. Sasaki Kyoto Unviersity 1997

K. Shurtleff B.Y.U. 1998-2001

F. Dimroth Frauenhoffer Institute 2000-2001

for Solar Cell Research

L. Reith University of Florida 2001-2003

X. Niu 2008-2012