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).

Diffuse diffracted features and ordered domain structures in GaInP layers grown by organometallic vapour phase epitaxy (with J.J. Yang, R. Spirydon, T.Y. Seong, and S.H. Lee), J. Electron. Mater. 27, 1117 (1998).

TEM study of ordering and domain structures in Mg-doped OMVPE GaInP layers (with S.M. Lee, S.W. Jun, and T.Y. Seong), Inst. Phys. Conf. Ser. 164, 291 (1999).

Step Structure and Ordering in Te-doped GaInP (with S.H. Lee and T.C. Hsu), J. Appl. Phys. 84, 2618 (1998).

Surface Photo Absorption Transients and Ordering in GaInP (with T.C. Hsu, J.H. Kim, and T.Y. Seong, J. Appl. Phys. 83, 3350 (1998).

Effect of P Precursor on Surface Structure and Ordering in GaInP (with T.C. Hsu and Yu Hsu), J. Crystal Growth 193, 1 (1998).

Step Structure and Ordering in GaInP (with S.H. Lee), J. Appl. Phys. 83, 3620 (1998).

Fundamental Aspects of Organometallic Vapor Phase Epitaxy, Materials Science and Engineering (B) 87, 97-116 (2001).

Pyrolysis of tertiarybutylamine alone and with trimethylgallium for GaN growth (with Z. Liu and R.T. Lee), J. Crystal Growth 191, 1 (1998).

Ordering in III/V Semiconductor Alloys, in *Thin Films: Heteroepitaxial Systems*, ed. M. Santos and W.K. Liu (World Scientific Publishing, 1998).

TEM study or ordered domain structures in Te-doped GaInP layers (with T.Y. Seong, C.J. Choi, R. Spyridon, and S.H. Lee), Inst. Phys. Conf. Ser. 164, 283 (1999).

Characterization of Unicompositional GaInP2 Ordering Heterostructures (with C.E. Inglefield, M.C. DeLong, P.C. Taylor, Y.S. Chun, I.H. Ho, J.H. Kim, and T.Y. Seong), J. Appl. Phys. 82, 5107 (1997).

Effects of Group V Precurson and Step Structure on Ordering in GaInP (with S.H. Lee and Yu Hsu), J. Electron. Mater. 26, 1244 (1997).

Growth of Order/Disorder Heterostructures in GaInP Using a Variation in V/III Ratio (with Y.S. Chun, Y. Hsu, I.H. Ho, and T.C. Hsu), J. Electron. Mater. 26, 1250 (1997).

Order and Surface Processes in III/V Semiconductor Alloys, Bulletin of the Materials Research Society, **22** 27 (1997).

Compositional Modulation and Ordering in Semiconductors, Bulletin of the Materials Research Society (with T. Pearsall) **22** 16 (1997).

Effects of V/III ratio on ordering and antiphase boundaries in GaInP layers (with J.H Kim, T.Y. Seong, and Y.S. Chun), Appl. Phys. Lett. **70**, 3137 (1997).

Heterostructures in GaInP Grown Using a Change in V/III Ratio, (with Y.S. Chun, H. Murata, S.H. Lee, I.H. Ho, T.C. Hsu, C. Inglefield, M. Delong, C. Taylor, J.H. Kim, and T.Y. Seong) J. Appl. Phys. **81**, 7778 (1997).

Incomplete Solubility in Nitride Alloys (with I.H. Ho), in III-V Nitrides, Proceedings of MRS Fall 1996 Meeting, ed. F.A. Ponce, T.D. Moustakas, I. Akasaki, and B.A. Monemar, Vol. 449, pp. 871-876 (1997).

Effect of Growth Rate on Step Structure and Ordering in GaInP (with Y.S. Chun, S.H. Lee, and I.H. Ho), J. Appl. Phys, **81**, 646 (1997).

Solid Phase Immiscibility in GaInN, (with I.H. Ho), Appl. Phys. Lett. **69**, 2701 (1996).

A Comparison of the Reactions of Phosphorus Precursors on Deposited GaP and InP Films (with C.W. Hill and L.P. Sadwick), J. Crystal Growth **181**, 321 (1997).

Effect of Growth Parameters on Step Structure and Ordering in GaInP (with Y.S. Chun, S.H. Lee, and I.H. Ho), J. Crystal Growth **174**, 585 (1997).

OMVPE Growth of Metastable GaAsSb and GaInAsSb Alloys Using TBAs and TBDMSb (with J.Shin, T.C. Hsu, and Y. Hsu), J. Crystal Growth **179**, 1 (1997)

Solubility Limit of Nitrogen in Binary III-V Systems, (with I.H. Ho), J.Crystal Growth - Special Issue on III-Nitrides, **178**, 1 (1997).

Lattice-Matched InAsN (x=0.38) on GaAs Grown by Molecular Beam Epitaxy (with Y.C. , T.P.E. Broekaert, H.Y. Liu, S. Tang,and I.H. Ho) MRS Proceedings, Vol. **423**, 335-340 (1996).

Use of V/III Ratio to Produce Heterostructures in Ordered GaInP (with Y.S. Chun, H. Murata, I.H. Ho, and T.C. Hsu), J. Crystal Growth, **170** 263 (1997).

Effects of Growth Temperature and V/III Ratio on Surface Structure and Ordering in GaInP (with H. Murata and I.H. Ho), J. Crystal Growth, **170** 219 (1997).

Chemical Beam Epitaxy of InP Without Precracking Using Tertiarybutylbisdimethylaminophosphine, (with H.H. Ryu and L.P. Sadwick), J. Crystal Growth 172, 1 (1997).

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), J. Vac. Sci. and Technology, Proceedings of Physics of Compound Semiconductor Interfaces **B14** 3113 (1996).

Correlation Between Surface Structure and Ordering in GaInP (with H. Murata, S.H. Lee, and I.H. Ho), J. Vac. Sci. and Technology, Proceedings of Physics of Compound Semiconductor Interfaces **B14** 3013 (1996).

Surface Photoabsorption Study of the Effect of Substrate Misorientation on Ordering in GaInP (with H. Murata, I.H. Ho, and Y. Hosokawa), Appl. Phys. Lett. **68**, 2237 (1996).

Low-Pressure Pyrolysis Studies of a New Phosphorus Precursor: Tertiarybutylbis(dimethylamino)phosphine, (with C.W. Hill, R.W. Gedridge, T.J. Groshens, and L.P. Sadwick), J. Electron. Mater. **25**, 1434 (1996).

Compositional Ordering in GaInP for Heterostructure Formation, Materials Research Society Proceedings Vol. 417, 207 (1996).

Materials Issues in High Brightness Light Emitting Diodes, in *High Brightness Light Emitting Diodes,* ed. G. Craford and G.B. Stringfellow, (Academic Press, San Diego, 1997).

Surface Photo Absorption Study of the Effects of Growth Temperature and V/III Ratio on Ordering in GaInP, (with H. Murata, I.H. Ho, L.C. Su, and Y. Hosokawa), J. Appl. Phys. **79**, 6895 (1996).

Effects of V/III Ratio on Ordering in GaInP: Atomic Scale Mechanisms, (with Y.S. Chun, H. Murata, T.C. Hsu, I.H. Ho, L.C. Su, and Y. Hosokawa), J. Appl. Phys. **79**, 6900 (1996).

Surface Photoabsorption Study of the Effect of Substrate Misorientation on Ordering in GaInP (with H. Murata, I.H. Ho, and Y. Hosokawa), Appl. Phys. Lett. **68**, 2237 (1996).

CBE Growth of InP Using BPE and TBP: A Comparative Study, (with C.W. Kim and L.P. Sadwick), J. Crystal Growth **164**, 104 (1996).

Trisdimethylaminophosphorus Reactions at Low Pressure on GaP, InP, and Quartz Surfaces (with C.W. Hill and L.P. Sadwick), J. Crystal Growth, **162**, 1 (1996).

Co-Pyrolysis of DIPSbH and TMIn (with Y.S. Chun and R.W. Gedridge), J. Electron. Mater. **25**, 1539 (1996).

Effect of Step Structure on Ordering in GaInP (with L.C. Su), Appl. Phys. Lett. **67**, 3626 (1995).

CBE Growth of InP Using EDMIn and BPE (with C.W. Kim and L. Sadwick), J. Electron. Mater. 26, 355 (1997).

Effect of Growth Rate on Step Structure and Ordering in GaInP (with L.C. Su) J. Appl. Phys.**78**, 6775 (1995).

Step Structure During OMVPE Growth of Ordered GaInP (with L.C. Su), J. Crystal Growth, Proceedings of Workshop on Atomic Scale Mechansims of Epitaxial Growth **163** 128 (1996).

Surface Photo-Absorption Studies of the Chemical Structure of GaInP Grown by OMVPE (with H. Murata, I.Ho. Ho, and T.C. Hsu), Appl. Phys. Lett. **67**, 3747 (1995).

InSb, GaSb, and GaInSb Grown Using Trisdimethylaminoantimony (with J. Shin and Y. Hsu), J. Electron. Mater. **24**, 1563 (1995).

Surface Structure During OMVPE Growth of Ordered GaInP, (with L.C. Su, Y.E. Strausser, and J.T. Thornton), J. Electron. Mater. **24**, 1591 (1995).

InTlSb Growth by OMVPE (with K.T. Huang and R.M. Cohen), J. Crystal Growth **156** 320(1995).

Atomic Force Microscopy Study of Surface Structure in Ordered GaInP Layers, (with L.C. Su, Y.E. Strausser, and J.T. Thornton), Appl. Phys. Lett. **66**, 3155 (1995).

OMVPE Growth of InAsSb Using Novel Group III and Group V Precursors (with K.T. Huang, Y. Hsu, and R.M. Cohen), J. Crystal Growth **156** 311(1995).

Growth of GaSb Using TDMASb (with J. Shin, A. Verma, and R.W. Gedridge), J. Crystal Growth, **151**, 1 (1995).

Atomic Ordering of GaInP studied by Kelvin Probe Force Microscopy (with Y. Leung, C.C. Williams, and L.C. Su), Appl. Phys. Lett. **66** 1264 (1995).

Advances in correlating the unusual optical properties of GaInP to the microstructure, M.C. DeLong, C.E. Ingefield, P.C. Taylor, L.C. Su, I.H. Ho, T.C. Hsu, G.B. Stringfellow, K.A. Bertness, and J.M. Olson, Inst. Phys. Conf. Ser. No. 141, 207-212, (1995).

Growth of InP, GaP, and GaInP by Chemical Beam Epitaxy Using Alternative Sources (with H.H. Ryu, C.W. Kim, L.P. Sadwick, R.W. Gedridge, and A.C. Jones), Inst. Phys. Conf. Ser. No. 141, 63 (1995).

Double Heterostructure Produced by Ordering in GaInP, International Symposium on Compound Semiconductors, (with L.C. Su and I.H. Ho), Inst. Phys. Conf. Ser. No. 141, 195-200 (1995).

Thermodynamics of Semiconductor Alloys for Optoelectronics, in *Materials for Optoelectronics*, ed. M. Quillec, Kluwer Academic Publishers (1996) pp. 23-60.

Ordering in GaInP Grown at Low Temperatures (with L.C. Su and I.H. Ho), J. Crystal Growth, **146**, 558 (1995).

Characterization of Ordered and Disordered GaInP Domains by Micro Raman

Spectroscopy (with A. Krost, N. Esser, H. Selber, J. Christen, W. Richter,

D. Bimberg, and L.C. Su), J. Crystal Growth, **145**, 171 (1994).

Chemical Beam Epitaxial Growth of GaP and InP Using Alternative, Safer Precursors (with L.P. Sadwick, C.W. Kim, H.H. Ryu, C.W. Hill, R.W. Gedridge, and A.C. Jones), Proceedings of MRS Meeting, Vol. 340, 167 (1994).

Effect of Substrate Misorientation on Ordering in GaInP, (with L.C. Su, I.H. Ho, Y. Leung, and C.C. Williams), Proceedings of MRS Meeting, Vol. 340, 123 (1994).

Trisdimethylaminoantimony: A New Sb Source for Low Temperature Epitaxial Growth of InSb, (with J. Shin, A. Verma, and R.W. Gedridge), J. Crystal Growth **143**, 15 (1994).

Order/Disorder Heterostructure in GaInP with Eg = 160 meV, (with L.C. Su, and I.H. Ho), J. Crystal Growth, **145**, 140 (1994).

Kinetically Controlled Order/Disorder Structure in GaInP, (with L.C. Su, and I.H. Ho), Appl. Phys. Lett. **65**, 749 (1994).

Control of Ordering in GaInP Using Growth Temperature, (with L.C. Su, and I.H. Ho), J. Appl. Phys. **76**, 3520(1994).

Low Pressure Pyrolysis of Alternate Phosphorus Precursors for Chemical Beam Epitaxial Growth of InP and Related Compounds, (with C.W. Hill and L.P. Sadwick), Proceedings of InP and Related Compounds (1994).

Identification of ordered and disordered GaInP domains by spatially resolved luminescence and Raman spectroscopy, (with A. Krost, N. Esser, H. Selber, J. Christen, W. Richter, D. Bimberg, and L.C. Su), J. Vac. Sci. and Technol. B12, 2558 (1994).

Pyrolysis of novel condensed phase phosphorus sources for chemical beam epitaxy applications (with C.W. Hill, L.P. Sadwick, C.W. Kim, and H.H. Rhu), S.P.I.E. Proceedings (1994).

Pyrolysis of Tertiarybutylphosphine at Low Pressure (with C.W. Hill and L.P. Sadwick), J. Electronic Materials **24** 731 (1995).

Effects of Substrate Misorientation and Growth Rate on Ordering in GaInP (with L.C. Su and I.H. Ho), J. Appl. Phys. **75** 3135 (1994).

InAsBi Alloys Grown by Organometallic Vapor Phase Epitaxy (with K.T. Huang, C.T. Chiu, and R.M. Cohen), J. Crystal Growth **134**, 29 (1993).

InAsSbBi Alloys Grown by OMVPE (with K.T. Huang, C.T. Chiu, and R.M. Cohen), J. Appl. Phys. **75**, 2857 (1994).

Fundamentals of Thin Film Growth, J. Crystal Growth **137**, 212 (1994).

A New Antimony Precursor, Diisopropylantimonyhydride (DIPSbH): Pyrolysis and OMVPE Growth, (with C. Hill, and J. Shin), Proceedings of SOTAPOCS XVIII (1993)

Compositional Ordering in Semiconductor Alloys, Common Themes and Mechanisms of Epitaxial Growth, ed. P. Fuoss, J. Tsao, D.W. Kisker, A. Zangwill, and T. Kuech, (Materials Research Society, Pittsburg, 1993) pp. 35-46.

TEM, TED, and AFM studies comparing atomic ordering in InAsSb layers grown by Molecular Beam Epitaxy and Organometallic Vapor Phase Epitaxy Grown, (with T.Y. Seong, G.R. Booker, A.G. Norman, and P.J.F. Harris), Inst. Phys. Conf. Ser. 157, 279 (1997).

TEM and TED studies of order-induced GaInP heterostructures, (with J.H. Kim, T.Y. Seong, and Y.C. Chun), Inst. Conf. Ser. 157, 275 (1997).

Pyrolysis of Diisopropylantimonyhydride: A New Precursor for OMVPE, (with C.W. Hill, M. Tao, and R.W. Gedridge), J. Electron. Mater. **23** 447 (1994).

Control of Ordering in GaInP and Effect on Bandgap Energy, (with L.C. Su, S.T. Pu, J. Christen, H. Selber, and D. Bimberg), J. Electron. Mater. **23**, 125 (1994).

Diisopropylantimonyhydride (DIPSbH) for Low Temperature Epitaxial Growth of InSb, (with J. Shin, K. Chiu, and R.W. Gedridge), J. Crystal Growth **132** 371 (1993).

Lattice Parameters and Crystal Structure of GaInAs, in *Properties of Lattice-Matched and Strained InGaAs*, ed. P. Bhattacharya (Institution of Electrical Engineers, United Kingdom) (1993).

Control and Characterization of Ordering in GaInP, (with L.C. Su, J. Christen, H. Selber, S.T. Pu, and D. Bimberg), Appl. Phys. Lett. **62** 3496 (1993).

Electrical Properties of Schottky and Ohmic Contacts to AlGaInP Structures, R.J. Hwu, L.P. Sadwick, T.Y. Wang, G.B. Stringfellow, and M. Sokolich, Electron Device Letters (1993).

OMVPE Reaction Kinetics, Chapter in *Handbook of Crystal Growth*, Vol. 3, ed. D.T.J. Hurle (Elsevier Science, Amsterdam, 1994) pp. 491-540.

Tertiarybutyldimethylantimony for GaSb Growth, (with C.H. Chen, C.T. Chiu, L.C. Su, K.T. Huang, and J. Shin), J. Electron. Mater. **22** 87 (1993).

Growth of Photovoltaic Semiconductors, (with E. Yablonovitch and J.E. Greene), J. Electron. Mater. **22** 49 (1993).

Triisopropylindium for OMVPE Growth, (with C.H. Chen, C.T. Chiu, and R.W. Gedridge), J. Crystal Growth, **124** 88 (1992).

Basic Principles of Organometallic Vapor Phase Epitaxy, in Proceedings of ISSCG-8, ed. E. Bourret (American Institute of Physics: Growth and Characterization of Semiconducting Materials, 1995).

Novel Precursors for Organometallic Vapor Phase Epitaxy (Invited Paper), J. Crystal Growth **128**, 503 (1993).

Long Wavelength Lattice Dynamics for Quaternary Alloys: GaInPSb and AlGaAsSb, (with D.S. Jaw) J. Appl. Phys. **72** 4265 (1992).

Tertiarybutyldimethylantimony for InSb Growth, (with C.H. Chen, K.T. Huang, and D.L. Drobeck), J. Crystal Growth, **124** 142 (1992).

Comparison of Epitaxial Growth Techniques for III/V Layer Structures, in Crystal Growth and Epitaxy, Proceedings of Croissance de cristaux et de couches epitaxiales a applications electroniques et optiques, ed. H.J. Scheel, (Assoc. Vaudoise des Chercheurs en Physique, Lausanne, Switzerland, 1993) pp. 241-255.

Thermodynamic and Kinetic Aspects of III/V Epitaxy, in Crystal Growth and Epitaxy, Proceedings of Croissance de cristaux et de couches epitaxiales a applications electroniques et optiques, ed. H.J. Scheel, (Assoc. Vaudoise des Chercheurs en Physique, Lausanne, Switzerland, 1993) 225-241.

Tertiarybutyldimethylantimony: A New Antimony Source for Low Temperature OMVPE Growth of InSb, (with C.H. Chen, D.C. Gordon, D.W. Brown and B.A. Vaartstra), Appl. Phys. Lett. **61**, 204 (1992).

Triisopropylindium, a New Precursor for OMVPE, (with C.H. Chen and C.T. Chiu), J. Crystal Growth, **126** 309 (1993).

Decomposition Studies of TBDMSb, (with D.S. Cao, C.H. Chen, C.W. Hill, S.H. Li, D.C. Gordon, D.W. Brown, and B.A. Vaartstra), J. Electron. Mater. **21** 583 (1992).

The Effect of Oxygen Incorporation in Semi-insulating AlGaInP, (with J.S. McCalmont, H.C. Casey, and T.Y. Wang), J. Appl. Phys. **71**, 1046 (1992).

Research on III/V Semiconductors, ONRSA Scientific Information Bulletin, 16, 85-92 (1991).

Effect of Step Motion on Ordering in GaInP and GaAsP, (with G.S. Chen), in *Gallium Arsenide and Related Compounds, 1991* ed. G.B. Stringfellow (The Institute of Physics, Bristol, 1992), pp. 377-382.

Radical Assisted Organometallic Vapor Phase Epitaxy, (with S.H. Li and C.H. Chen), in *Gallium Arsenide and Related Compounds, 1991* ed. G.B. Stringfellow (The Institute of Physics, Bristol, 1992), pp. 553-558.

New Sources for OMVPE, Record of Alloy Semiconductor Physics and Electronics Symposium, Nagoya, Japan, (1991) pp.3-14.

Fundamental Aspects of Vapor Growth and Epitaxy, J. Crystal Growth **115**, 1 (1992).

Radical-Assisted OMVPE Growth of GaAs, (with S.H. Li), Appl. Phys. Lett. **59**, 2124 (1991).

Ultra-Low Temperature OMVPE of InAs and InAsBi, (with K.Y. Ma, Z.M. Fang, and R.M. Cohen), J. Electron. Mater. **21**, 143 (1992).

Use of Surface Grooves to Control Ordering in GaAsP (with G.S. Chen), Appl. Phys. Lett. 59, 3258 (1991).

Effect of Growth Temperature on Photoluminescence of InAs Grown by OMVPE (with Z.M. Fang, K.Y. Ma, and R.M. Cohen), Appl. Phys. Lett. **59**, 1446 (1991).

Investigation of Organometallic Vapor Phase Epitaxial of InAs and InAsBi at Temperatures as Low as 275°C, (with K.Y. Ma, Z.M. Fang, and R.M. Cohen), J. Appl. Phys. **70**, 3940 (1991).

Atomic Ordering in III/V Semiconductor Alloys, (with G.S. Chen), J. Vacuum Sci. and Technol. B **9**, 2182 (1991)

Effects of Step Motion on Ordering In GaInP, (with G.S. Chen), Appl. Phys. Lett. **59**, 324 (1991)

OMVPE Growth of AlGaSb and AlGaAsSb, (with D.S. Cao, and Z.M. Fang), J. Crystal Growth **113**, 441 (1991).

Triisopropylantimony for OMVPE of GaSb and InSb, (with C.H. Chen, Z.M. Fang, and R.W. Gedridge), Appl. Phys. Lett. **58** 2532 (1991).

Decomposition Studies of Triisopropylantimony and Triallylantimony, (with S.H. Li, C.A. Larsen, G.B. Stringfellow, and R.W. Gedridge), J. Electron. Mater. **20** 457 (1991).

The Use of Triisopropylantimony for the Growth of InSb and GaSb, (with C.H. Chen and Z.M. Fang), J. Appl. Phys. **69**, 7605 (1991)

Atomic Ordering in InAsP Grown by OMVPE (with D.H. Jaw and G.S. Chen), Appl. Phys. Lett. **59**, 114 (1991)

Atomic Ordering in GaAsP (with G.S. Chen and D.H. Jaw), J. Appl. Phys. **69**, 4263 (1991)

Decomposition Mechanisms of Antimony Source Compounds for OMVPE (with C.A. Larsen, R.W. Gedridge, and S.H. Li), *Chemical Perspectives of Microelectronic Materials - II* (Materials Research Society, Pittsburg, Penn, 1991), pp. 129-134.

Raman Scattering in AlGaAsSb Quaternary Alloys (with D.H. Jaw and D.S. Cao), J. Appl. Phys. **69**, 2552 (1991).

Effects of Substrate Misorientation on Ordering in GaAsP Grown by Organometallic Vapor Phase Epitaxy (with G.S. Chen and D.H. Jaw), Appl. Phys. Lett. **57** 2475 (1990).

Electrical Properties of Schottky and Ohmic Contacts to Highly Insulating AlGaInP Structures (with R.J. Hwu, T.Y. Wang, L.P. Sadwick, and M. Sokolich), Proceedings of the EDMS Symposium, Taiwan, 1990.

Monoethylarsine Pyrolysis Alone and with Trimethylarsine, (with S.H. Li and C.A. Larsen), J. Electron. Mater. **20**, 187 (1991).

Radical Reactions in Pyrolysis of Triethylarsine and Diethylarsine, (with S.H. Li and C.A. Larsen), J. Crystal Growth **112**, 515 (1991).

Enhanced Absorption Characteristics of GaSb/InAs and InSb/InAs Strained Layer Superlattices Grown on (111) Substrates by MOVPE, (with M. Lakrimi, N.J. Mason, R.J. Nicholas, G.Summers, and P.J. Walker), J. Crystal Growth, **107**, 518 (1991).

Use of Tertiarybutylphosphine for OMVPE Growth of AlGaInP (with D.S. Cao), J. Electron. Mater. **20**, 97 (1991).

 GaInP/AlGaInP Strained Quantum Wells Grown Using Atmospheric Pressure OMVPE (with T.Y. Wang, A.W. Kimball, G.S. Chen, and D. Birkedal), J. Crystal Growth, **109**, 285 (1991).

Effect of Growth Rate on Properties of GaInP Grown by OMVPE (with D.S. Cao, G.S. Chen, and A.W. Kimball), J. Crystal Growth, **109**, 279 (1991).

Decomposition Mechanisms of TVSb and Reactions with TMGa (with C.A. Larsen and R.W. Gedridge) Chemistry of Materials **3**, 96 (1991).

Mechanistic Study of Organometallic Vapor Phase Epitaxy, in *Epitaxial Crystal Growth* , ed. E. Lendvay (Trans Tech Publications, Zurich, 1991).

Mechanistic Study of Organometallic Vapor Phase Epitaxy, Cryst. Prop. Prep. **31**

207-229 (1991).

Epitaxial Growth of Strained III/V Semiconductor Alloys--Composition and Microstructure, in *Condensed Systems of Low Dimensionality*, ed. J. L. Beeby (Plenum Press, London, 1991) pp. 435-449.

Growth and Characterization of Nearly Lattice Matched GaInAs on InP (with D. Birkedal, E.H. Reihlen, and T.Y. Wang) Proceedings of 14th Nordic Semiconductor Meeting, ed. Ole Hansen (1990), pp. 342-345.

Optical Absorption and Emission of InPSb Alloys, (with E.H. Reihlen, M.J. Jou, and Z.M. Fang), J. Appl. Phys. **68** 4604 (1990).

OMVPE Growth and Characterization of Bi-Containing III/V Alloys, (with K.Y. Ma, Z.M. Fang, and R.M. Cohen), J. Crystal Growth **107**, 416 (1991).

Comparative Pyrolysis Study of Ethylarsines (with S.H. Li and C.A. Larsen), J. Crystal Growth **107**, 32 (1991).

Optical Properties of GaInPSb Alloys Grown by OMVPE (with D.H. Jaw, M.J. Jou, and Z.M. Fang), J. Appl. Phys. **68** 3538 (1990).

Decomposition Mechanisms of Trimethylantimony and Reactions with Trimethylindium (with C.A. Larsen and S.H. Li) Chemistry of Materials **3**, 39 (1991).

Photoluminescence of InAsBi and InAsSbBi Grown by OMVPE (with Z.M. Fang, K.Y. Ma, D.H. Jaw, and R.M. Cohen), J. Appl. Phys. **68**, 1187 (1990).

Atmospheric Pressure OMVPE Growth of GaInP/AlGaInP Strained Quantum Wells, (with T.Y. Wang, A.W. Kimball, G.S. Chen, and D. Birkedal), J. Appl. Phys. **68**, 3356 (1990).

Organometallic Vapor Phase Epitaxial Growth of a New Quaternary Semiconductor Alloy GaInPSb, (with M.J. Jou, D.H. Jaw, and Z.M. Fang), J. Crystal Growth **106**, 208 (1990).

Optical Absorption and Emission of GaPSb Alloys (with E.H. Reihlen, M.J. Jou, and D.H. Jaw), J. Appl. Phys. **68**, 760 (1990).

Organometallic Vapor Phase Epitaxy Growth and Characterization of Bi-containing III/V Alloys (with K.Y. Ma, Z.M. Fang, and R.M. Cohen), J. Appl. Phys. **68** 4586 (1990).

Alternate Sources and Growth Chemistry for OMVPE and CBE Processes, J. Crystal Growth **105** 260 (1990).

Electron Microscopic Study of Atomic Structure of OMVPE Grown GaInAs/InP Quantum Wells (with T. Hsu and T.Y. Wang), J. of Microscopy **163**, 275 (1991).

Transmission Electron Microscope Characterization of AlGaInP Grown by OMVPE, (with G.S. Chen and T.Y. Wang), Appl. Phys. Lett. **56**, 1463 (1990).

Ordering in III/V Alloys, in *Impurities, Defects, and Diffusion in Semiconductors: Bulk and Layered Structures* , ed. J. Bernholc, E.E. Haller, and D.J. Wolford, Materials Research Society Volume 163, 893 (1990).

Photoluminescence of InSb, InAs, and InAsSb Grown by OMVPE, (with Z.M. Fang, K.Y. Ma, D.H. Jaw, and R.M. Cohen), J. Appl. Phys. **67** 7034 (1990).

Dimethylarsine: Pyrolysis Mechanisms and Use for OMVPE Growth, (with S.H. Li, C.A. Larsen, C.H. Chen, and D.W. Brown), J. Electron. Mater. **19** 299 (1990).

Measurement of the Fundamental Bandgaps of a Strained GaInAs Layer (with E.H. Reihlen, D. Birkedal, and T.Y. Wang), J. Appl. Phys. **68** 1750 (1990).

Atmospheric Pressure Organometallic Vapor Phase Epitaxial Growth of AlGaInP Using Trimethylalkyls (with D.S. Cao and A.W. Kimball), J. Appl. Phys. **67** 739 (1990).

Trimethylarsine Decomposition Mechanisms (with S.H. Li and C.A. Larsen), J. Crystal Growth **102** 117(1990).

Structural Characterization of Very Thin GaInAs/InP Quantum Wells Grown by Atmospheric Pressure Organometallic Vapor Phase Epitaxy (with T.Y. Wang, H.R. Jen, and G.S. Chen), J. Appl. Phys. **67** 563 (1990)

Organometallic Vapor Phase Epitaxial Growth of High Quality GaInP at High Growth Rates (with D.S. Cao, A.W. Kimball, G.S. Chen, and K.L. Fry), J. Appl. Phys. **66**, 5384 (1989).

Organometallic Vapor Phase Epitaxial Growth and Characterization of InAsBi and InAsSbBi (with K.Y. Ma, D.H. Jaw, Z.M. Fang, and R.M. Cohen), Appl. Phys. Lett. **55** 2420 (1989).

Strain Effects on GaInAs/InP Single Quantum Wells Grown by Organometallic Vapor Phase Epitaxy, (with T.Y. Wang), J. Appl. Phys. **67** 344 (1990).

Annealed AuGe Based Ohmic Contacts on InP with Ion Milling Prior to Metallization (with J. Dunn), J. Electron. Mater. **19** L1 (1990).

Long-Wavelength Lattice Dynamics of GaInAsSb Quaternary Alloys, (with D.H. Jaw and Y.T. Cherng), J. Appl. Phys. **66** 1965 (1989).

Organometallic Vapor Phase Epitaxyial Growth Studies of GaPSb and InPSb (with M.J. Jou), J. Crystal Growth **98** 679(1989).

Two-Dimensional Electron Gas Density Calculation in GaInAs/AlInAs, GaInAs/InP, and GaInAs/InP/AlInAs Heterostructures (with K.S. Yoon and R.J. Huber), J. Appl. Phys. **66** 5915 (1989).

Non-Hydride Group V Sources for OMVPE, in *III/V Heterostructures for Electronic/Photonic Devices* ed. C.W. Tu, V.D. Matters, and A.C. Gossard (Materials Research Society, Pittsburg, 1989), Vol. 145, 171.

Photoluminescence in Strained-Layer Quantum Wells, (with T.Y. Wang, Z.H. Lin, and P.C. Taylor), J. Vacuum Science and Technology **B7**, 824 (1989).

Systematic Studies of the Effect of Growth Interruption on GaInAs/InP Quantum Wells Grown by AP-OMVPE, (with T.Y. Wang and E.H. Reihlen), J. Appl. Phys. **66** 5376 (1989).

The Effect of Supplemental t-Butyl Radicals on the Pyrolysis Mechanisms of Tertiarybutylarsine, Tertiarybutylphosphine, and Ditertiarybutylarsine, (with S.H. Li, N.I. Buchan, C.A. Larsen, W.P. Kosar, and D.W. Brown), J. Crystal Growth **98** 309 (1989).

Kinetics of Reaction Between Trimethylgallium and Arsine (with C.A. Larsen, S.H. Li, and N.I. Buchan) J. Crystal Growth **102** 126 (1990)

Decomposition Mechanisms of Trimethylgallium (with C.A. Larsen, N.I. Buchan, S.H. Li, D.W. Brown) J. Crystal Growth **102** 103 (1990)

Fundamental Issues in Heteroepitaxy (panel of 13 scientists meeting in a Department of Energy advisory workshop), J. Mater. Res. **5** 852 (1990).

Long Range [111] Ordering in GaAsP (with H.R. Jen and D.S. Cao), Applied Physics Letters **54** 1890 (1989).

Annealing Effects in the Ag/Al-(100) InP System: Al Redistribution and Film Recrystallization (with J. Dunn and H.R. Jen), J. Electron. Mater. **18** 445 (1989).

Study of Tertiarybutylphosphine Pyrolysis Using a Deuterated Source (with S.H. Li, C.A. Larsen, and N.I. Buchan), J. Appl. Phys. **65** 5161 (1989).

Pyrolysis of Tertiarybutylphosphine (with S.H. Li, C.A. Larsen, and N.I. Buchan), J. Electron. Mater. **18** 457 (1989).

OMVPE Growth Mechanism for GaP Using Tertiarybutyphosphine and Trimethylgallium, (with S.H. Li, C.A. Larsen, and N.I. Buchan), J. Crystal Growth **96**, 906 (1989).

Photoluminescence and Photoluminescence Excitation Spectroscopy Study of Thin GaInAs/InP Quantum Wells (with E.H. Reihlen, A. Persson, and T.Y. Wang), Proceedings of IEEE LEOS (1989).

OMVPE Growth of GaAs Using Dimethylarsine (with C.H. Chen and E.H. Reihlen, Journal of Crystal Growth **96** 497 (1989).

Ordered Structures and Metastable Alloys Grown by OMVPE, Journal of Crystal Growth, **98** 108 (1989). co/published as a book chapter in *Alloy Semiconductor Physics and Electronics* (Elsevier, Amsterdam, 1989).

Current-voltage and Capacitance-voltage Behavior of High Resistivity AlGaInP on GaAs (with H.C. Casey, J.S. McCalmont, H. Pandharpurkar, and T.Y. Wang), Appl. Phys. Lett. **54** 650 (1989).

Photoluminescence Study of Carrier Collection and Recombination in Thin GaInAs/InP Single Quantum Wells (with E.H. Reihlen, A. Persson, T.Y. Wang, and K.L. Fry), J. Appl. Phys. **66** 5554(1989).

Long Range Order in InAsSb (with H.R. Jen and K.Y. Ma), Appl. Phys. Lett. **54** 1154 (1989).

Decomposition Mechanisms in the OMVPE Growth of GaP Using Trimethylgallium and tert-butylphosphine (with S. H. Li, C.A. Larsen, and N.I. Buchan), Inst. Phys. Conf. Ser. Vol. 96, 153 (1989).

Strained Layer Superlattices for Reduction of Dislocation Density in GaAsP on GaAs by Organometallic Vapor Phase Epitaxy (with D.S. Cao, C.H. Chen, K.L. Fry, and E.H. Reihlen), J. Appl. Phys.**65** 2451 (1989).

Reaction Mechanisms in OMVPE Growth of GaAs Determined Using Labelling Experiments, in *Mechanisms of Reactions of Organometallic Compounds with Surfaces* , ed D.J. Cole-Hamilton and J.O. Williams (Plenum Publishing Corp, London, 1989).

OMVPE Growth of Low Dislocation Density GaAsP on GaAs Using Strained Layer Superlattices, (with D.S. Cao, C.H. Chen, K.L. Fry, and E.H. Reihlen), Inst. Phys. Conf. Ser. Vol. 96, 199 (1989).

Reaction Mechanisms in OMVPE Growth of GaAs Determined Using D2 Labelling Experiments, Progress in Crystal Growth and Characterization **19** 115 (1989).

InP and GaInP Band Structure Under Pressure, (with S.W. Tozer, D.J. Wolford, J.A. Bradley, and D. Bour), Proceedings of International Conference on the Physics of Semiconductors, Poland (1988).

Valence and Conduction Band Discontinuities and Exciton Binding Energies in InP/GaInAs/InP Strained Quantum Wells, (with Z.H. Lin, T.Y. Wang, and P.C. Taylor), Proceedings of 19th International Conference on the Physics of Semiconductors, Poland (1988).

Lattice Vibration Spectra of GaPSb and InPSb, (with Y.T. Cherng, D.H. Jaw, and M.J. Jou), J. Appl. Phys. **65** 3285 (1989).

Raman Scattering in InAsSb Grown by OMVPE, (with Y.T. Cherng and K.Y. Ma), Appl. Phys. Lett. **53** 886 (1988).

Study of Atomic Structure of OMVPE Grown GaInAs/InP Quantum Wells (Extended Abstract Only) (with T. Hsu and T.Y. Wang), Fourth Asia-Pacific Conference and Workshop on Electron Micrsocopy, Bangkok, Thailand, July 1988.

GaAs Growth Using Tertiarybutylarsine and Trimethylgallium, (with C.A. Larsen, N.I. Buchan, and S.H. Li), J. Crystal Growth **93** 62 (1988).

OMVPE Growth of the New Semiconductor Alloys GaPSb and InPSb, (with M.J. Jou, Y.T. Cherng, and H.R. Jen), J. Crystal Growth **93** 15 (1988).

Mechanisms of GaAs Growth Using Tertiarybutylarsine and Trimethylgallium, (with C.A. Larsen, N.I. Buchan, and S.H. Li), J. Crystal Growth **94** 673 (1989).

Decomposition Mechanisms of Tertiarybutylarsine, (with C.A. Larsen, N.I. Buchan, and S.H. Li), J. Crystal Growth **94** 663 (1989).

Thermal Modulation of Photoluminescence in InP/GaInAs/InP Quantum Wells, (with Z.H. Lin, T.Y. Wang, and P.C. Taylor), J. Vacuum Science and Technology B **6** 1224 (1988).

Non-Hydride Group V Sources for OMVPE, J. Electron. Mater. **17** 327 (1988).

OMVPE Growth and Characterization of the Metastable Alloy - InPSb, (with M.J. Jou and Y.T. Cherng), J. Appl Phys. **64** 1472 (1988).

A Mass Specytroscopic Study of the Concerted Reaction Mechanism of TMIn and PH3 to Grow InP, (with N.I. Buchan and C.A. Larsen), J. Crystal Growth **92** 605 (1988).

Raman Scattering in GaP1-xSbx, (with Y.T. Cherng, M.J. Jou, and H.R. Jen), Appl. Phys. Lett. J. Appl. Phys. **63** 5444 (1988).

OMVPE Growth of GaInAs/InP Quantum Well Structures, *Epitaxy of Semiconductor Layered Structured*, ed. R.T. Tung, L.R. Dawson, and R.L. Gunshore, (Materials Research Socitey, Pittsburg, 1988), pp. 515.

Exciton Binding Energies in GaInAs/InP Quantum Wells Determined by Thermally Modulated Photoluminescence, (with Z. Lin, T.Y. Wang, and P.C. Taylor), Appl. Phys. Lett. **52** 1590 (1988).

OMVPE Growth of a New Semiconductor Alloy - GaPSb, (with M.J. Jou, Y.T. Cherng and H.R. Jen), Appl. Phys. Lett. **52**, 549 (1988).

Mass Spectrometric Studies of Trimethylindium Pyrolysis, (with N.I. Buchan and C.A. Larsen), J. Crystal Growth **92** 591 (1988).

Ag/Al Schottky Contacts on n-InP, (with J. Dunn), J. Electron. Mater. **17**, 181 (1988).

Reaction Mechanisms in the Organometallic Vapor Phase Epitaxial Growth of GaAs, (with C.A. Larsen and N.I. Buchan), Appl. Phys. Lett. **52** 480 (1988).

Atomic Steps in Thin GaInAs/InP Quantum Well Structures Grown by OMVPE (with T.Y. Wang, K.L. Fry, A. Personne, and E.H. Reihlen), J. Appl. Phys. **63** 2674 (1988).

Transient Transport in Bulk GaInAs and the 2-DEG in GaInAs/AlInAs (with K.S. Yoon and R.J. Huber), J. Appl. Phys. **63** 1126 (1988).

Atomic Steps at GaInAs/InP Interfaces Grown by OMVPE (with T.Y. Wang, K.L. Fry. A. Persson, and E.H. Reihlen), Appl. Phys. Lett. **52** 290 (1988).

Use of Tertiarybutylphosphine for the Growth of InP and GaAsP, (with C.H. Chen and D.S. Cao), J. Electron. Mater. **17** 67 (1988).

The Kinetics of Ordering in GaAsSb Grown by Organometallic Vapor Phase Epitaxy, (with H.R. Jen, M.J. Jou, and Y.T. Cherng), J. Crystal Growth **85** 175 (1987).

Mass Spectrometric Studies of Phosphine Pyrolysis and OMVPE Growth of InP, (with C.A. Larsen and N.I. Buchan), J. Crystal Growth **85** 148 (1987).

Reactions in OMVPE Growth of InP, (with N.I. Buchan and C.A. Larsen), Materials Research Society Proceedings No. 94, (Materials Research Society, Pittsburg, 1987), p. 245-254.

Elucidation of OMVPE Growth Mechanisms for InP, (with N.I. Buchan and C.A. Larsen), Appl. Phys. Lett. **51** 1024 (1987).

Technologies Based on Organometallic Vapor Phase Epitaxy, in *Crystal Growth in Science and Technology*, ed. H. Arendt and J. Hullinger (Plenum, New York, 1989), 303-316.

Epitaxy, (with J.S. Harris) in *Process Challenges in Compound Semiconductors* , ed. A.M. Glass, (National Academy Press, Washington, D.C., 1988), Chapter 6.

MonteCarlo Calculation of Velocity-Field Characteristics in GaInAs/InP and GaInAs/AlInAs Single-Well Heterostructures, (with K.S. Yoon and R.J. Huber), Journal of Applied Physics **62**, 1931 (1987).

Ordered Structures in OMVPE Grown GaAsSb and GaInAsSb Alloys, (with H.R. Jen, M.J. Cherng, and M.J. Jou), *GaAs and Related Compounds, 1986*(Institute of Physics, London, 1987) Vol. 83, 159.

Isobutylphosphine and Tertiarybutylphosphine Sources for OMVPE Growth of InP, (with C.H. Chen and C.A. Larsen), *GaAs and Related Compounds, 1986*(Institute of Physics, London, 1987) Vol. 83, 75.

Ordered Structures In GaAs1-xSbx Grown by Organometallic Vapor Phase Epitaxy, (with H.R. Jen, M.J. Cherng, and M.J. Jou), Ternary and Multinary Compounds, ed. S.K. Deb and A. Zunger (Materials Research Society, Pittsburg, 1987), p. 353-8.

Use of Tertiarybutylarsine for GaAs Growth,(with, C.H. Chen and C.A. Larsen), Appl. Phys. Lett. **50**, 218 (1987).

Time Resolved Photoluminescence in InP Doping Superlattices, (with R. Ranganathan, M. Gal, J.M. Viner, P.C. Taylor, and J.S. Yuan), Proceedings of the International Semiconductor Conference, Stockholm, August, 1986.

The Growth of Ultra-pure InP by Atmospheric Pressure OMVPE, (with C.H. Chen, M. Kitamura, and R.M. Cohen), Appl. Phys. Lett. **49**, 963 (1986).(#100)

Doping Superlattices in GaP, (with M. Kitamura and R.M. Cohen), J. Appl. Phys. **61**, 1533 (1987).

Thermodynamics, Kinetics and Mechanisms of OMVPE, in *Processing of Electronic Materials*, ed C.G. Law and R. Pollard (The American Institute of Chemical Engineers, New York, 1987), pp. 114-133.

Thermodynamic Aspects of VPE, in *Advanced Crystal Growth*, (Prentice Hall International, Ltd, Hempstead, UK, 1987), pp. 289-308.

MOVPE Growth of GaInAsSb, (with M.J. Cherng, H.R. Jen, C.A. Larsen, and P. C. Taylor), J. Crystal Growth **77**, 408 (1986).

MOVPE Growth of InP Using Isobutylphosphine and Tertbutylphosphine, (with C.H. Chen and C.A. Larsen), J. Crystal Growth **77**, 11 (1986).

Ordered Structures in GaAsSb Alloys Grown by Organometallic Vapor Phase Epitaxy, (with H.R. Jen and M.J. Cherng), Appl. Phys. Lett. **48**, 1603 (1986).

Organometallic Vapor Phase Epitaxial Growth of InP Using New Phosphorus Sources, (with C.A. Larsen, C.H. Chen, M. Kitamura, D.W. Brown and A.J. Robertson), Appl. Phys. Lett. **48**, 1531 (1986).

High Quality GaInP Grown by OMVPE, (with J.S. Yuan, C.H. Chen, and R.M. Cohen), J. Crystal Growth **78**, 63 (1986).

OMVPE Growth and Characterization of GaxIn1-xP(x=0.51, 0.65, 0.69), (with J.S. Yuan, M.T. Tsai, C.H. Chen and R.M. Cohen), J. Appl. Phys. **60**, 1346 (1986).

Thermally Modulated Photoluminescence in GaInAs-InP Quantum Wells, (with M. Gal, C.P. Kuo, B. Lee, R. Ranganathan, and P.C. Taylor), Phys. Rev. B **34**, 1356(1986).

Optical Properties of InP Doping Superlattices Grown by Metal Organic Chemical Vapor Deposition, J. Vac. Sci. **B5**, 504 (1987).

GaInAsSb Metastable Alloys Grown by Organometallic Vapor Phase Epitaxy, (with, M.J. Cherng, D.W. Kisker, A.K. Srivastava, and J.L. Zyskind), Appl. Phys. Lett. **48**,419 (1986).

OMVPE Growth of InP and GaInAs Using Ethyldimethylindium, (with K.L. Fry, C.P. Kuo, C.A. Larsen and R.M. Cohen), J. Electron. Mater. **15**, 91 (1986).

OMVPE Growth of Metastable III/V Alloys: GaAsSb, (with M.J. Cherng, Y.T. Cherng, H.R. Jen, P. Harper, and R.M. Cohen), J. Electron. Mater. **15**, 79 (1986).

 Modulated-Reflectance Spectroscopy of InP Doping-Superlattices (with J. Gal, J.S. Yuan, J.M. Viner and P.C. Taylor), Phys. Rev. B **33**, 4410 (1986).

OMVPE Growth of In Containing III/V Alloys, Institute of Physics Conference Series, **79**, 115 (1986).

GaInAs/InP Quantum Wells Grown by OMVPE (with C.P. Kuo, and K.L. Fry), Appl. Phys. Lett. **47**, 855 (1985).

Doping Studies of GaInP Organometallic Vapor Phase Epitaxy, (with , C.C. Hsu, J.S. Yuan, and R.M. Cohen), J. Appl. Phys. **59**, 395 (1986).

Doping Studies of InP Grown by OMVPE, (with, C.C. Hsu, J.S. Yuan and R.M. Cohen), J. Crystal Growth **74**, 535 (1986).

The Role of Impurities in III/V Semiconductors Grown by Organometallic Vapor Phase Epitaxy, Paharo Dunes, California, May, 1985 J. Crystal Growth **75**, 91 (1986).

The 12th International Symposium on GaAs and Related Compounds and Company Visits in Japan, ONRFE Scientific Bulletin, **10**, 116-122 (1985).

Doping Superlattices in OMVPE InP, (with J.S. Yuan, M. Gal, and P.C. Taylor), Appl. Phys. Lett. **47**, 405 (1985).

Photoluminescence Study of Confined Electron Hole Plasma in GaInAs Heterostructures, (with M. Gal, J.M. Viner, P.C. Taylor, C.P. Kuo and R.M. Cohen), J. Appl. Phys. **58**, 948 (1985).

Decompositon Kinetics of OMVPE Precursors, (with, C.A. Larsen), J. Crystal Growth, **75**, 247 (1986).

Effect of Mismatch Strain on Band Gap in III/V Semiconductors, (with C.P. Kuo, S.K. Vong and R.M. Cohen), J. Appl. Phys. **57**, 5428 (1985).

III-V Phase Diagrams, in *Advances in Electronic Materials*, ed. B. W. Wessels and G.Y. Chin, (American Society for Metals, Metals Park, Ohio, 1986), Chapter 2.

Characterization of GaInAs Grown With TMIn, (with, C.P. Kuo, R.M. Cohen and K.L. Fry), J. Electron. Mater. **14**, 231 (1985).

Raman and Photoluminescence Spectra of GaAsSb (with R.M. Cohen, M.J. Cherng, and R.E. Benner), J. Appl. Phys. **57**, 4817 (1985).

Photoluminescence of OMVPE GaInAs, (with K.L. Fry, C.P. Kuo and R.M. Cohen), Appl. Phys. Lett. **46**, 955 (1985).

Organometallic Vapor Phase Epitaxial Growth of III-V Semiconductors, in *Semiconductors and Semimetals*, V22A, ed. W.T. Tsang, (Academic Press, Inc, New York, 1985), pp.209-261.

Vapor Phase Epitaxial Growth of III-V Semiconductors, in *Crystal Growth of Electronic Materials,* ed. E. Kaldis (North Holland, Amsterdam, 1985), pp. 247-281.

Thermodynamic Aspects of OMVPE, J. Crystal Growth, **70**, 133 (1984).

OMVPE Growth of AlGaInP, (with J.S. Yuan, C.C. Hsu, and R.M. Cohen), J. Appl. Phys. **57**,1380 (1985).

A Critical Appraisal of Growth Mechanisms in OMVPE, J. Crystal Growth **68** 111 (1984).

Fundamental Comparison of OMPVE with MBE for III/V Alloys, Proceedings of the 1st International Workshop on Future Electron Devices, Tokyo, Japan II-3 (1984).

GaAsSb Growth by OMVPE, (with M.J. Cherng and R.M. Cohen), J. Electron. Mater. **13**, 799 (1984).

OMVPE Growth of High Purity GaInAs Using TMIn, (with C.P. Kuo, J.S. Yuan, R.M. Cohen, and J. Dunn), Appl. Phys. Lett. **44**, 550 (1984).

OMVPE Growth of GaAs0.5Sb0.5, (with M.J. Cherng and R.M. Cohen), Appl. Phys. Lett. **44**, 677 (1984).

Immiscibility and Spinodal Decomposition in III/V Alloys, J. Crystal Growth **65**, 454 (1983).

OMVPE Growth of GaInAs, (with C.P. Kuo and R.M. Cohen), J. Crystal Growth **64**, 461 (1983).

OMVPE Growth of GaAs1-xSbx: Solid Composition, (with M.J. Cherng), J. Crystal Growth **64**, 413 (1983).

OMVPE Growth of InP and GaInP Using TMIn, (with C.C. Hsu and R.M. Cohen), Proceedings of Electrochemical Symposium on III-V Optoelectronics and Device Related Processes, The ECS Proc. **83-13**, 193 (1983).

OMVPE Growth of GaInP, (with C.C. Hsu and R.M. Cohen), J. Crystal Growth **62**, 648 (1983).

Vapor Phase Epitaxial Growth of III/V Semiconductors: Applications, Lecture Notes, 5th International School on Crystal Growth, September (1983).

OMVPE Growth of InP Using TMIn, (with C.C. Hsu and R.M. Cohen), J. Crystal Growth **63**, 8 (1983).

AlGaAsSb Phase Diagram, (with J.R. Pessetto), J. Crystal Growth **62**, 1 (1983).

Thermodynamic Aspects of Organometallic Vapor Phase Epitaxy, J. Crystal Growth **62**, 225 (1983).

Ga2/3Se-Se Phase Equilibria: A Partially Associated Regular Solution Model for the Ga-Se Liquid, (with J.C. Mikkelson), J. Phys. Chem. Solids **44**, 1141 (1983).

The Vapor Phase Interaction of Trimethylaluminum With Graphite During OMPVE, (with D.W. Kisker, D.A. Stevenson, and J.N. Miller), J. de Physique **C5**, 221 (1982).

Miscibility Gaps and Spinodal Decomposition in III/V Quaternary Alloys of the Type AxByC1-x-yD, J. Appl. Phys. **54**, 404 (1983).

Spinodal Decomposition and Clustering in III/V Alloys, J. Electron. Mater. **11**, 903 (1982).

OMPVE Growth of AlGaAs, SPIE Proceedings, **323**, (The International Society for Optical Engineering, Bellingham, Washington, 1982), p. 26.

Comment on Reassessment of Space-Charge and Central-Cell Scattering Contributions to GaAs Electron Mobility, J. Appl. Phys., **53**, 5345 (1982).

Miscibility Gaps in Quaternary III/V Alloys, J. Crystal Growth **58**, 195 (1982).

Epitaxy, Reports on Progress in Physics, **45**, 469 (1982).

Oxygen Gettering by Graphite Baffles During Organometallic VPE AlGaAs Growth, (with D.W. Kisker and J.M. Miller), Appl. Phys. Lett., **40**, 614 (1982).

OMVPE Growth of AlGaAs, J. Crystal Growth **55**, 42 (1981).

Calculation of Energy Band Gaps in Quaternary III/V Alloys, J. Electron. Mater. **10**, 919 (1981).

Photoluminescence of Ion Implanted Carbon in GaAs, (with W. Koschel, F. Briones, J. Gladstone, and G. Patterson), Appl. Phys. Lett. **39**, 581 (1981).

Carbon in Molecular Beam Epitaxial GaAs, (with R. Stall and W. Koschel), Appl. Phys. Lett. **38**, 156 (1981).

Electron Scattering at Localized Impurity Potentials in GaAs, (with D. Chattopadhyay and H.J. Queisser), J. Phys. Soc. Japan **49**, 293 (1980).

Growth of High Quality AlGaAs by OMPVE for Laser Devices, (with E.E. Wagner and G. Hom), J. Electron. Mater. **10**, 239 (1981).

Deep Electron Traps in OMPVE Grown AlGaAs, (with E.E. Wagner, D.E. Mars, and G. Hom), J. Appl. Phys. **51**, 5434 (1980).

Electron Mobility in Compensated GaAs and AlGaAs, (with H. Kunzel), J. App. Phys. **51**, 3254 (1980).

Electron Mobility in Compensated GaAs and AlGaAs, Appl. Phys. Lett. **36**, 540 (1980).

Photoluminescence of Shallow Acceptors in Epitaxial AlGaAs, (with R. Linnebach), J. Appl. Phys. **51**, 2212 (1980).

Vapor Phase Growth, Chapter in *Crystal Growth*, ed. B. Pamplin (Pergamon Press, New York, 1980).

Increase in Luminscence Efficiency of AlGaAs Growth by Organometallic VPE, (with G. Hom), Appl. Phys. Lett. **34**, 794 (1979).

Electron Mobility in AlGaAs, J. Appl. Phys. **50**, 4178 (1979).

Organometallic VPE Growth of AlGaAs, (with H.T. Hall, Jr.), J. Electron. Mater. **8**, 201 (1979).

VPE Growth of III/V Compounds, Annual Review of Materials Science **8**, 73 (1978).

VPE Growth of AlGaAs, (with H.T. Hall, Jr.) J. Crystal Growth **43**, 47 (1978).

LPE of III/V Semiconductors, chapter in *Crystal Growth: A Tutorial Approach*, ed. W. Bardsley, D.T.J. Hurle, and J.B. Mullin, (North Holland Publishing Company, Amsterdam, 1979).

Hydride VPE Growth of GaAs for FETs (with G. Hom) J. Electrochem. Soc. **124**, 1806 (1977).

Degradation of GaP:N LEDs (with T.R. Cass and R.A. Burmeister), J. Electron. Mater. **6**, 295 (1977).

A Mechanism for Liquid Phase Epitaxial Growth of Nonequilibrium Compositions Producing a Coherent Interface, (with J.P. Hirth) J. Appl. Phys. **48**, 1813 (1977).

Effect of Surface Treatment on Surface Recombination Velocity and Diode Leakage Current in GaP, J. Vac. Sci. Technol. **13**, 908 (1976).

Effect of III/V Ratio on the Properties of Vapor Phase Epitaxial GaP (with H.T. Hall, Jr.), J. Electrochem. Soc. **123**, 916 (1976).

Green Emitting Diodes in Vapor Phase Epitaxial GaP (with D. Kerps), Solid-State Electronics **18**, 1019 (1975).

Electrical Properties of Nitrogen Doped GaP (with H.T. Hall, Jr. and R.A. Burmeister) J. Appl. Phys. **46**, 3006 (1975).

Growth and Properties of VPE GaP for Green LEDs (with M.E. Weiner and R.A. Burmeister) J. Electron. Mater. **4**, 363 (1975).

Calculation of Ternary and Quaternary III/V Phase Diagrams, J. Crystal Growth **27**, 21 (1974).

Dislocations in Vapor Phase Epitaxial GaP (with P.F. Lindquist, T.A. Cass, and R.A. Burmeister) J. Electron. Mater. **3**, 497 (1974).

Calculation of Distribution Coefficients of Donors in III/V Semiconductors, J. Phys. Chem. Solids, **35**, 775 (1975).

Calculation of Regular Solution Interaction Parameters in III/V Solid Solutions, J. Phys. Chem. Solids **34**, 1749 (1973).

Liquid Phase Epitaxial Growth of GaInP (with P.F. Lindquist and R.A. Burmeister), J. Electron. Mater. **1** 437 (1972).

Chemistry of III/V Compounds and Alloys, chapter in Solid State Chemistry Volume of *International Review of Science,*  ed. L.E.J. Roberts (MTP Company, London, 1975).

Calculation of the Solubility of the Solid-Gas Distribution Coefficient of N in GaP, J. Electrochem. Soc. **119**, 1780 (1972).

The Importance of Lattice Mismatch in the Growth of GaInP, J. Appl. Phys. **43**, 3455 (1972).

Calculation of Ternary Phase Diagrams of III/V Systems, J. Phys. Chem. Solids **33**, 665 (1972).

The Calculation of Regular Solution Interaction Parameters Between Elements from Groups III, IV, and V of the Periodic Table, Mater. Res. Bull. **6**, 371 (1971).

Liquid Phase Epitaxial Growth of InAsSb (with P.E. Greene), J. Electrochem. Soc. **118**, 805 (1971).

A Q.C.E. Calculaton of the Ge-Si-Sn and Ge-Si-Pb Ternary Phase Diagrams (with P.E. Greene) J. Electrochem. Soc. **117**, 1075 (1970).

Calculation of the Ga-In-P Ternary Phase Diagram Using the Quasi-Chemical Equilibrium Model, J. Electrochem. Soc. **117**, 1301 (1970).

Calculation of the III/V Ternary Phase Diagrams: Ga-In-As and In-As-Sb (with P.E. Greene) J. Phys. Chem. Solids B30P, 1779 (1969).

Dislocations in GaAsP (with P.E. Greene), J. Appl. Phys. **40**, 502 (1969).

Radiative Pair Transitions in p-type ZnSe:Cu Crystals (with R.H. Bube), J. Appl. Phys. **40**, 3657 (1969).

Photoelectronic Properties of ZnSe Crystals (with R.H. Bube), Phys. Rev. **171**, 903 (1968).

Radiative Pair Transitions in p-Type ZnSe:Cu Crystals (with R.H. Bube), in *II/VI Semiconducting CompoundsP,* ed. D.G. Thomas (W.A. Benjamin Co, New York, 1967).

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