

Jonathan E. Guyer

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SKILLS

Experimental Molecular beam epitaxy (MBE), reflection high energy electron diffraction (RHEED), atomic force microscopy (AFM), diffuse reflectance spectroscopy (DRS), x-ray diffraction (XRD), photoluminescence (PL), photolithography.

Programming C/C++, Tcl, FORTRAN, Object Pascal, Mathematica, IGOR Pro. Macintosh, Windows, Unix.

EXPERIENCE

National Institute of Standards and Technology, Gaithersburg, MD, 1997–present

- Developing phase-field model of electrodeposition in trenches for copper-damascene integrated circuits.
- Exploited DRS and RHEED for surface science and growth characterization.
- Implemented *in situ* DRS for improved temperature control during MBE growth of pseudomorphic high electron mobility transistors (pHEMTs).

Northwestern University, Evanston, IL, 1991–7

- Developed first linear stability model of heteroepitaxial alloy thin film growth.
- Successfully tested theory by depositing III-V semiconductor thin films using MBE. Characterized evolution of strain and morphology using reflection high energy electron diffraction and atomic force microscopy.
- Teaching assistant for phase transformations in materials.

Electrotechnical Laboratory, Tsukuba, Japan, 1995 NSF Summer Institute in Japan

- Studied Japanese language and collaborated with Japanese scientists to grow and characterize $\text{Si}_{1-x}\text{Ge}_x$ films.

United States Navy, Nuclear Powered Submarine, USS Casimir Pulaski (SSBN-633) BLUE, 1986–91

- Achieved rank of Lieutenant (O-3).
- Supervised and instructed up to 50 in nuclear reactor operations, quality assurance, and weapons systems.

EDUCATION

PhD, Northwestern University, Evanston, IL

Materials Science and Engineering

Dissertation: “Stability of Alloy Thin Films”

Advisors: Prof. Peter W. Voorhees and Prof. Scott A. Barnett

Naval Nuclear Propulsion School, Orlando, FL and **S5G Prototype Reactor**, Idaho Falls, ID

Intensive, year-long, practical and theoretical training in nuclear reactor operations

BS, Northwestern University, Evanston, IL

Materials Science and Engineering

Thesis: “Temperature Dependence of Photoluminescence in InP/InAsP Strained Layer Superlattices”

Advisors: Dean Jerome B. Cohen and Prof. Bruce W. Wessels

HONORS

National Research Council Postdoctoral Associateship, 1997–99
Materials Research Society Graduate Student Award for Outstanding Research, 1996
National Defense Science and Engineering Graduate Fellowship, 1991–94
Navy Achievement Medal, 1991
National Merit Scholarship, 1982–86
Naval Reserve Officer Training Corps Scholarship, 1982–86

MEMBERSHIPS

Materials Research Society
American Association for Crystal Growth
Society for Industrial and Applied Mathematics

PUBLICATIONS

“Morphological Stability of Alloy Thin Films”, by J. E. Guyer and P. W. Voorhees
Phys. Rev. Lett. **74**, 4031 (1995)

“The Stability of Lattice Mismatched Thin Films”, by J. E. Guyer and P. W. Voorhees
In *Evolution of Epitaxial Structure and Morphology*, MRS Symposia Proceedings **399**, p. 351, edited by
A. Zangwill, D. Jesson, D. Chambliss, and R. Clarke (Materials Research Society, Pittsburgh, PA, 1995)

“Morphological Stability of Alloy Thin Films”, by J. E. Guyer and P. W. Voorhees
Phys. Rev. B **54**, 11710 (1996)

“Morphological Stability and Compositional Uniformity of Alloy Thin Films”, by J. E. Guyer and P. W. Voorhees
J. Crystal Growth **187**, 150 (1998)

“Are You Being Served? Version Management for the Well-appointed Developer”, by Jonathan Guyer
MacTech Magazine **15**(11), 16 (1999)

“Morphological Evolution of $\text{In}_{0.26}\text{Ga}_{0.74}\text{As}$ Grown Under Compression on $\text{GaAs}(001)$ and Under Tension on
 $\text{InP}(001)$ by Molecular Beam Epitaxy”, by J. E. Guyer, S. A. Barnett, and P. W. Voorhees,
J. Crystal Growth **217**, 1 (2000)

“Real-time measurements of the pseudodielectric function of low-temperature-grown GaAs ”, by D. A. Gajewski,
J. E. Guyer, and J. G. Pellegrino, Appl. Phys. Lett. **77**(4), 540 (2000)

“Diffuse Reflectance Spectroscopy for *In Situ* Process Monitoring and Control During Molecular Beam Epitaxy
Growth of $\text{InGaAs}/\text{AlGaAs}$ Pseudomorphic High Electron Mobility Transistors”, by J. E. Guyer, W. F. Tseng,
and J. G. Pellegrino, J. Vac. Sci. Technol. B **18**(5), 2518 (2000)

“*In Situ* Surface Preparation of $\text{InP}(001)$ by Glancing-Angle 1 keV Ar^+ Bombardment”, by J. E. Guyer, J. G. C. La-
banda, M. R. Pillai, P. M. DeLuca, and S. A. Barnett (in preparation)

“ $\text{GaAs}(001)$ Surface Reconstructions as Functions of Substrate Temperature and $\text{As}_2\text{:Ga}$ Flux Ratio”, by J. E. Guyer,
D. A. Gajewski, and J. G. Pellegrino (in preparation)

PRESENTATIONS

- “The Morphological Stability of Coherent, Binary Alloy, Epitaxial Films”, by J. E. Guyer and P. W. Voorhees
Materials Research Society 1994 Fall Meeting
- “Morphological Stability of Alloy Thin Films”, by J. E. Guyer and P. W. Voorhees
1995 Workshop on Strains and Epitaxial Growth, Tsukuba, Japan
- “Compositional Stability of Alloy Thin Films”, by J. E. Guyer, S. A. Barnett, and P. W. Voorhees
American Vacuum Society 1996 Meeting
- “Compositional Stability of Alloy Thin Films”, by J. E. Guyer, S. A. Barnett, and P. W. Voorhees
Materials Research Society 1996 Fall Meeting
- “Stability of Alloy Thin Films”, by J. E. Guyer, S. A. Barnett, and P. W. Voorhees
1997 Gordon Research Conference: Thin Film and Crystal Growth Mechanisms (poster)
- “Morphological Stability and Compositional Uniformity of Alloy Thin Films”, by J. E. Guyer, S. A. Barnett, and
P. W. Voorhees, 1998 NSF-IMM Symposium on Micromechanic Modeling of Industrial Materials
- “Diffuse Reflectance Spectroscopy for *In Situ* Process Monitoring and Control During III-V Molecular Beam
Epitaxy”, by J. E. Guyer, D. A. Gajewski, and J. G. Pellegrino, 1998 East Coast MBE Users Group Meeting
- “*In Situ* Diffuse Reflectance Spectroscopy for Measurement and Control During III-V Molecular Beam Epitaxy”,
by J. E. Guyer, W. F. Tseng, W. R. Thurber, E. M. Vogel, D. A. Gajewski, and J. G. Pellegrino,
Materials Research Society 1999 Fall Meeting (nominated for best poster)
- “Diffuse Reflectance Spectroscopy and Reflection High Energy Electron Diffraction to Measure GaAs(001) Surface
Reconstructions During Molecular Beam Epitaxy as Functions of Substrate Temperature and V:III Ratio”,
by J. E. Guyer, D. A. Gajewski, and J. G. Pellegrino,
Twelfth American Conference on Crystal Growth and Epitaxy, 2000