

# Westly M. Nolting Ph.D.

FAILURE ANALYSIS R&D ENGINEER

Hillsboro, OR, USA

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## Experience

### Intel Corporation

Hillsboro, OR, USA

FAILURE ANALYSIS R&D ENGINEER

Dec. 2018 – Present

- Failure analysis of Intel's latest process nodes as well as Intel 3, Intel 4, Intel 7, 10nm, and 14nm process nodes
- Utilizing SEM, FIB, TEM, and STEM to analyze defects in Intel's latest process nodes
- Utilizing electrical characterization tools to isolate defects in complex microarchitectures on Intel products
- Expert proficiency with use of Infrared, Laser, X-ray, and various optical probing tools for defect localization
- Marginal circuit analysis and defect isolation for test chips
- Lead engineer for test program development for Early Life Failure (ELF) and Early Life Reliability (ELR) testing
- Lead failure analysis engineer for reliability learning in early life failures
- Low Yield Analysis for all of Intel's process nodes
- Responsible for accurate presentation and analysis of data to all customers, preparation of models and reports for yield improvement, and presenting findings to all levels of management
- Responsible for training and mentoring new engineers in the failure analysis group on all tools and techniques and product architectures
- Application and software development for failure analysis tools
- Database management for defect analysis and yield improvement
- Responsible for the development of new techniques for defect analysis and yield improvement

### SUNY Polytechnic Institute

Albany, NY, USA

GRADUATE RESEARCH SCIENTIST

Aug. 2012 – May 2018

- Monte Carlo modelling of electron transport in metal-semiconductor junctions
- Scanning Tunneling Microscopy (STM) utilizing ballistic electron emission microscopy (BEEM) in ultra high vacuum (UHV) environment
- SEM, STM, FIB, STEM experience imaging materials for FinFETs, Schottky barriers, Silicides, and Tunnel Barriers
- Fabrication of novel Schottky barrier devices utilizing Molecular Beam Epitaxy (MBE), electron-beam PVD, and magnetron sputtering
- Maintenance of UHV and metrology tools
- Responsible for accurate presentation and analysis of data, preparation of manuscripts for scientific publication, and presenting the research results at scientific conferences

### SUNY Albany – SUNY Research Foundation

Albany, NY, USA

GRADUATE RESEARCH SCIENTIST

May 2012 – Aug. 2017

- Academic fab environment utilizing state-of-the-art industrial fab to develop device structures
- Metrology for device structures on novel Schottky barrier diode devices
- Design and testing of novel spintronic device structures, utilizing non-local Hanle voltage, spin valve, and DC spin current measurements
- Magnetic Tunnel Junction (MTJ) characterization and STT-MRAM modeling with stacks deposited using SINGULUS Timaris tool
- Responsible for accurate presentation and analysis of data, preparation of manuscripts for scientific publication, and presenting the research results at scientific conferences

### University of New Orleans – Advanced Materials Research Institute

New Orleans, LA, USA

GRADUATE RESEARCH ASSISTANT

May 2010 – May 2012

- Designing, building, and testing of a high-temperature Hall effect and Nernst effect experiment
- Maintaining spark plasma sintering (SPS), 10-ton hot press furnace, and electrical/magnetic characterization tools
- Fabrication of ceramic thermoelectric materials
- Performing thermal and electrical measurements such as Hall effect, thermal conductivity, Seebeck coefficient, and electrical conductivity
- Responsible for accurate presentation and analysis of data, preparation of manuscripts for scientific publication, and presenting the research results at scientific conferences

## Skills

<b>Metrology &amp; Instrumentation:</b>	SEM, TEM, Auger, XRD, BEEM, AFM, XPS, STM, VSM, MBE, PPMS
<b>Fault Isolation:</b>	LVI, LVP, LVT, LADA, SDL, TIVA, OBIRCH, SMI, IREM, TDR, TFS Meridian, X-ray, XADA
<b>Programming Languages</b>	Python, C/C++, C#, LaTeX, Perl, CS, tcl, SQL
<b>Software</b>	Cadence, Allegro, Avalon, Mentor Graphics, Microsoft Office, ImageJ, Origin, Matlab, Mathematica, Labview

## Education

### State University of New York at Albany / Polytechnic Institute

PH.D. IN NANOSCALE SCIENCE AND ENGINEERING

Albany, NY, USA

Aug. 2012 - May 2018

### State University of New York at Albany - College of Nanoscale Science and Engineering

M.S. IN NANOSCALE SCIENCE AND ENGINEERING

Albany, NY, USA

Aug. 2012 - Aug. 2017

### University of New Orleans

M.S. IN APPLIED PHYSICS

New Orleans, LA, USA

May 2010 - May 2012

### University of New Orleans

B.S. IN PHYSICS

New Orleans, LA, USA

Aug. 2006 - May 2010

## Writing

### Laboratory X-Ray-Assisted Device Alteration for Fault Isolation and Post-Silicon Debug

2024 IEEE International Reliability  
Physics Symposium (IRPS)

CELIO, K. C., SEN, S., NISENBOIM, E., PARDY, P. M., NGUYEN, B., LE, V., NOLTING, W., KUMAR, S., PETERSON, C. A., RAVEH, A.,  
JOHNSON, K., STRIPE, B., SU, F., LUN, M., LEWIS, S., SPINK, R. I. AND YUN, W.

2024

- To explore the utility of x-rays for LADA-like work, we have developed a first-of-a-kind x-ray-assisted device alteration (XADA) tool, with an industry-leading spot size and flux density, capable of interfacing with modern integrated circuit test equipment. We demonstrate for the first time the use of XADA for real fault isolation and post-silicon debug cases.

### Nanoscale Schottky Barrier Visualization Utilizing Computational Modeling and Ballistic Electron Emission Microscopy

J. Appl. Phys

W. NOLTING, C. DURCAN, S. GASSNER, J. GOLDBERG, R. BALSANO, VINCENT P. LABELLA

2018

- The findings demonstrate the ability to detect the effects of partial silicide formation in the W and Cr samples and the presence of two barrier heights in intermixed Au/Ag films upon the electrostatic barrier of a buried interface with nanoscale resolution.

### Fermi Level Manipulation through Native Doping in the Topological Insulator Bi<sub>2</sub>Se<sub>3</sub>

ACS Nano

L. WALSH, A. GREEN, A. DOU, W. NOLTING, ET. AL.

2018

- We report the growth of near-intrinsic Bi<sub>2</sub>Se<sub>3</sub> with a minimal Se vacancy concentration providing a Fermi level near midgap with no extrinsic counter-doping required. We also demonstrate the crucial ability to tune EF from below midgap into the upper half of the gap near the conduction band edge by controlling the Se vacancy concentration using post-growth anneals.

### Detection of Silicide Formation in Nanoscale Visualization of Interface Electrostatics

APL

W. NOLTING, C. DURCAN, V. P. LABELLA

2017

- The ability to detect localized silicide formation at a buried metal semiconductor Schottky interface is demonstrated via nanoscale measurements of the electrostatic barrier.

### Nanoscale Schottky Barrier Mapping of Thermally Evaporated and Sputter Deposited W/Si(001) Diodes Using Ballistic Electron Emission Microscopy

JVST B

W. NOLTING, C. DURCAN, A. J. NARASIMHAM, V. P. LABELLA

2016

- Ballistic electron emission microscopy has been utilized to demonstrate differences in the interface electrostatics of tungsten-Si(001) Schottky diodes fabricated using two different deposition techniques: thermal evaporation using electron-beam heating and magnetron sputtering

### Effects of Electrical Bias and Temperature Stress on the Negative Magnetoresistance of a Low-k Dielectric

J. Appl. Phys

B.T. MCGOWAN, W. M. NOLTING, J.R. LLOYD

2015

- A study of the effect of electrical bias and temperature stress (BTS) on the negative magnetoresistance (MR) of a low-k dielectric composed of SiCOH is presented.

### Correlation Between Microstructure and Drastically Reduced Lattice Thermal Conductivity in Bi<sub>2</sub>Te<sub>3</sub>/Bi Nanocomposites for High Thermoelectric Figure of Merit

Mater. Sci. in Semiconductor  
Processing

D.K. MISRA, S. SUMITHRA, N.S. CHAUHAN. W. M. NOLTING, P.F.P. POUDEU, KEVIN L. STOKES

2015

- D.K. Misra, S. Sumithra, N.S. Chauhan. W. M. Nolting, P.F.P. Poudeu, Kevin L. Stokes

### Effect of NiTe NanoInclusions on Thermoelectric Properties of Bi<sub>2</sub>Te<sub>3</sub>

Journal of Electronic Materials

S. SUMITHRA, N. J. TAKAS, W. M. NOLTING, S. SAPKOTA, P.F.P. POUDEU, AND K.L. STOKES

2012

- S. Sumithra, N. J. Takas, W. M. Nolting, S. Sapkota, P.F.P. Poudeu, and K.L. Stokes

## Enhancement in Thermoelectric Figure of Merit in Nanostructured $\text{Bi}_2\text{Te}_3$ with Semimetal Nanoinclusions

S. SUMITHRA, N. J. TAKAS, D. K. MISRA, W. M. NOLTING, P. F. P. POUDEU, AND K. L. STOKES

*Adv. Energy Materials*

2011

- S. Sumithra, N. J. Takas, D. K. Misra, W. M. Nolting, P. F. P. Poudeu, and K. L. Stokes

## Electronic Transport in Thermoelectric Bismuth Telluride

W. NOLTING, K. L. STOKES

*University of New Orleans*

*Scholar Works UNO Thesis Publication*

- W. Nolting, K. L. Stokes