TIMOTHY J. DRABIK, PH.D.

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SUMMARY

Over thirty years experience in microelectronics and optics research and development in the U.S. and in Europe. Record of visionary innovation in semiconductor device fabrication, micro-optics, optoelectronic packaging, integrated optoelectronic systems, display technology, and parallel computing architectures, underpinned by command over a wide and interdisciplinary base of skills. Strong record of scholarly publication and worldwide reputation in technology community. Leadership roles in high-profile, U.S.- and E.U.-based, government- and industry-funded, technology program development and implementation. Demonstrated ability in developing new enabling technologies into competitive product applications. Extensive intellectual property development and litigation support experience at the highest levels. Strong, results-oriented management and leadership skills. Areas of expertise include:

- WDM transmission and switching
- Microelectronics fabrication processes
- Refractive and diffractive micro-optics
- Compound semiconductor devices
- Advanced packaging
- Classical and quantum optics
- Digital and analog VLSI design
- Signal processing
- Neuromorphic computing
- Low-cost, wafer-level manufacturing
- Microfluidics structures
- Optical telecommunication and switching
- Display technologies
- Optical storage technologies
- Computer and memory architectures
- Guided-wave optics technologies
- Liquid crystal technology and components
- Thermomechanical design
- Optoelectronic integration and packaging
- Optical high-speed interconnection
- Micromachining
- Communication and information theory

EMPLOYMENT

PAGE MILL TECHNOLOGY CORP., LOS ALTOS, CA **SEP. 2001 TO PRESENT**

Founder and CTO

Technology development: focus on new planar component designs and fabrication technologies for displays, optical telecommunications, and biofluidics. Innovative design and advanced, batch-fabrication techniques enable disruptive improvements in functionality and cost. Consulting: design, problem-solving, reverse-engineering, due-diligence, intellectual property counseling, litigation support, translation of highly technical German-language material.

Current activities relate to improving liquid crystal display contrast and dynamic range, and developing integrated components for optical telecommunications.

SPECTRALANE, INC., SANTA CLARA, CA **OCT. 2001 TO MAY 2002**

Consultant

In an early-stage, long-haul optical networking company fielding a new technology, resolved problems with optical system architecture, packaging, and process control; developed optical metrology techniques and design automation tools; conducted early-stage project management.

DISPLAYTECH, INC., LONGMONT, CO **JULY 2000 TO OCT. 2001**

Director of Telecommunications

Position reporting to CTO. Responsible for identifying and developing opportunities in optical networking for a microdisplay company founded on liquid-crystal-on-silicon (LCOS) core technology.

Performed surveys of optical networking markets and evaluated trends in that market. Identified attractive long-haul and metro-area opportunities matching the company's technology, engineering expertise and production environment.

Created novel device and component designs exploiting the unique phenomenology of ferroelectric liquid crystals (FLCs). Formulated new, highly integrated embodiments of core transparent optical networking functions amenable to FLC/silicon capabilities.

Designed next-generation transparent optical switches, reconfigurable optical add/drop multiplexors, and polarization control products to effect disruptive cost-reductions through leverage of existing, high-volume manufacturing base and integration of additional low-cost technologies.

Directed consultants working in Stanford Nanofabrication Facility (SNF) on the application of advanced processes for guided-wave device fabrication and silicon micromachining to the exploration of new device configurations.

STANFORD UNIVERSITY **JAN. 1999 TO SEP. 2009**

DEPARTMENT OF ELECTRICAL ENGINEERING

Professor (Consulting) ('06 to '09)

Associate Professor (Consulting) ('00 to '06)

Associate Professor (Visiting) ('99 to '00)

Current research relates to the development of disruptively cheap components for polarization control and optical polarization mode dispersion compensation for enhancing signal integrity in optical fiber communication.

In connection with the *MARCO/DARPA Interconnect Focus Center* (IFC), formulated and conducted a nationwide survey of microelectronics industry leaders in order to quantify interconnect problems, identify opportunities for optical interconnection, and formulate system-level requirements for optics in next-generation, high-performance digital systems.

Designed module packaging schemas (passive microoptics and optomechanics) for off-chip and on-chip optical interconnection in high-performance digital systems, to support future system-

level performance requirements projected by the International Technology Roadmap for Semiconductors (ITRS) of the Semiconductor Industry Association.

Directed research activity in end-to-end optical link design, optoelectronic hybridization, and packaging.

Directed a Small Business Technology Transfer Research (STTR) program in wafer-level, additive fabrication technology of fluid channels for liquid-crystal, VLSI-based microdisplays. Developed joint hardware–algorithm codesigns for efficient, artifact-free, full-color, motion video on binary microdisplays.

Directed a DARPA program on *Optically-Interconnected Intelligent RAM Multiprocessors*: global performance modeling, optimal utilization of silicon and optical-interconnect resources, minimization of processor–memory latency.

GEORGIA TECH LORRAINE **JAN. 1995 TO JUNE 1997**

TECHNOPÔLE METZ, METZ, FRANCE

Research Director

Program development activity at *Georgia Tech Lorraine* (GTL), the European platform of the Georgia Institute of Technology (GIT) in Metz, France, leading to the creation and launch of the *Centre GTL–CNRS Telecom* at GTL as a joint venture between GIT and the French national research body *Centre National de la Recherche Scientifique* (CNRS).

The Center pursues research in telecommunications related areas of optics in cooperation with a network of partner laboratories of the Georgia Institute of Technology, the CNRS and other university and industrial entities. Research areas include quantum encryption, diffractive optics, single-photon detection, electromagnetics, advanced laser technology, and nonlinear optics.

Built international research program consortia from among major European academic research institutions and high-technology industry. Program elements included diffractive micro-optics, optoelectronic hybrid integration, advanced packaging, vertical-cavity laser (VCL) technology, and optical interconnection architectures. Formulated program goals to exploit strengths of constituents.

GEORGIA INSTITUTE OF TECHNOLOGY **SEP. 1990 TO JUNE 2000**

SCHOOL OF ELECTRICAL ENGINEERING AND MICROELECTRONICS RESEARCH CENTER

Assistant Professor ('90 to '96)

Associate Professor with tenure ('96 to '00)

A vertically-oriented program in optoelectronic hybridization and packaging, passive micro-optics, and architectures for optoelectronic integrated systems:

- Demonstrated and commercialized the first silicon-VLSI-based ferroelectric liquid crystal (FLC) microdisplays based on DRAM and SRAM active VLSI backplanes.
- Developed new techniques for device-scale, quasi-monolithic hybridization of high-speed, optoelectronic devices with silicon VLSI.

- Investigated interconnect capabilities and limitations of free-space optics for digital systems. Created new design automation techniques for optimal joint utilization of wire and optical interconnection resources.
- Demonstrated optoelectronic neural-analog monolithic arrays implementing vision functions: real-time edge/motion enhancement with optical image output, stereo disparity mapping.
- Implemented new silicon VLSI driver and photoreceiver backplane designs for 2-D, vertical-cavity, surface-emitting laser (VCSEL) arrays flip-chip bonded in area-array configuration.
- Developed integrated diffractive–refractive micro-optical array technology for optical interconnect applications.
- Developed techniques for optimal design of passive optical structures incorporating fabrication process models.
- Developed ultra-thin, low-thermal-resistance die-attach technology for high-power microelectronics and optoelectronics applications.
- Applied nonlinear digital signal processing and optimal filtering formalisms to the synthesis of a technique for proximity effect correction in electron-beam nanolithography.

Theses advised:

- Zhou, Z., "Diffractive Elements for Optical Interconnects," Ph.D. Thesis, Georgia Institute of Technology, 1993.
- Hargis, M. C., "Metal-Semiconductor-Metal Photodetectors and their Integration via Epitaxial Liftoff," Ph.D. Thesis, Georgia Institute of Technology, 1994.
- Titus, Albert H., "Biologically-Based Stereopsis: Theories and VLSI Implementation," Ph.D. Thesis, Georgia Institute of Technology, 1997.
- Hatrisse, Xavier, "New Components for Passive Optical Network and Cable Television," M.S. Thesis, Georgia Institute of Technology, 1998.
- Callahan, John J., "Optoelectronic Hybrid Integration Utilizing Au/Sn Bonding," Ph.D. Thesis, Georgia Institute of Technology, 2000.

Program development and research support:

- Industrial support from Kodak, Sun Microsystems, IBM, Displaytech.
- State and Federal support: Georgia Research Alliance, NSF, DARPA, Army Research Laboratory.
- Principal contributor to successful NSF Engineering Research Center on Packaging.

Distinctions: NSF Research Initiation Award, 1990.

Research Associate ('87 to '90)

Investigated new architectures for optically interconnected parallel computers. Explored mechanisms for defect-tolerance through optical interconnection. Established bounds on the volume-time complexity of data-parallel algorithms on a large class of optically interconnected architectures.

Developed a technology base for prototyping optoelectronic integrated systems, including the first demonstration of ferroelectric liquid crystal reflective light modulator cells integrated with mainstream silicon VLSI flows.

Distinctions: President's Fellowship.

UNIVERSITY OF CALIFORNIA, SAN DIEGO **APR. 1984 TO AUG. 1987**

DEPARTMENT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

Research Associate

Conceived and developed the shift-connected SIMD architecture for optically interconnected processor arrays. Developed and performed complexity analysis of algorithms for multidimensional, data-parallel tasks on shift-connected arrays.

Participated in design and fabrication of spatial light modulators in silicon/PLZT and silicon/organic-electro-optical materials systems.

Distinctions: California MICRO Fellowship; IBM Fellowship

AT&T BELL LABORATORIES **JUNE 1981 TO MAR. 1984**

ADVANCED SWITCHING TECHNOLOGY LABORATORY, NAPERVILLE, IL

Member of Technical Staff

Evaluated new optoelectronic technologies and incorporated them into prototypes for wideband, fiber local access networks.

Investigated application of fine-line nMOS VLSI technology to new wideband multiplexing and switching systems.

EARNED DEGREES

PH.D. IN ELECTRICAL ENGINEERING **1990**

Georgia Institute of Technology, Atlanta, GA

Distinctions: Sigma Xi *Outstanding Ph.D. Thesis* Award

M.S.E.E. IN OPTICS AND DIGITAL SIGNAL PROCESSING **1982**

Georgia Institute of Technology, Atlanta, GA

B.S. IN ELECTRICAL ENGINEERING AND B.S. MATHEMATICS **1981**

Rose-Hulman Institute of Technology, Terre Haute, IN

Distinctions: Certification in technical translation of German to English
1979–80 academic year at Universität Stuttgart, Germany

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