

## YIK KHOON (BRANDON) EE

### Contact Information

E-mail: [ee@lehigh.edu](mailto:ee@lehigh.edu)

### Education

**June 2005 – November 2009, Lehigh University (Bethlehem, PA, USA)**

**Doctor of Philosophy (Ph.D.)** in Electrical Engineering

- Cumulative GPA: 3.96/4.0
- PhD Advisor: Prof. Nelson Tansu (ECE, Lehigh)
- Dissertation Title: “*Reduced Dislocation Engineering and Enhanced Light Extraction Efficiency of III-Nitride Light Emitting Diodes.*”
- Ph.D. Committee Members: Prof. Nelson Tansu (Chair), Prof. Yujie Ding, Prof. Helen M. Chan, Prof. Richard P. Vinci, and Prof. James F. Gilchrist.
- Research Areas: physics of semiconductor optoelectronics materials and devices, physics of semiconductor nanostructures, and III-Nitride semiconductors for solid state lighting.

**June 2005 – May 2007, Lehigh University (Bethlehem, PA, USA)**

**Master of Science** in Electrical Engineering

- Cumulative GPA: 3.95/4.0
- Research Assistant, PhD Advisor: Prof. Nelson Tansu (ECE, Lehigh)

**Fall 1999 – May 2003, Nanyang Technological University (Singapore)**

**Bachelor of Engineering (B.Eng.)** in Electrical and Electronic Engineering with a **minor in Business**

- Graduated with 1<sup>st</sup> Class Honors (top 5% of 1000 students)
- Scholarships: Singapore Economic Development Board Photonics Scholarship
- Specialization: Photonics and Optoelectronics

### Professional Experiences

**December 2009 – Present, Philips Lumileds Lighting Company (San Jose, CA, USA)**

**Senior Development Engineer**

- Develop next generation III-nitride MOCVD epitaxy growth processes.
- Responsible for the planning and execution of growth and hardware development projects leading to the implementation of next generation epitaxy processes.
- Support high-volume manufacturing of epitaxial wafers for high-efficiency InGaN Light-Emitting Diodes.
- Strong background in semiconductor materials and device physics.
- Familiarity with III-V materials and device characterization techniques.
- Extensive experience growing III-V and III-nitride semiconductors by MOCVD.
- Experienced with project management, and driving yield
- Strong in Statistical Process Control and Failure Mode and Effects Analysis.

**June 2005 – November 2009, Lehigh University (Bethlehem, PA, USA)**

**Ph.D. Candidate and Research Assistant**

Department of Electrical and Computer Engineering (ECE)

P. C. Rossin College of Engineering and Applied Science

& Center for Optical Technologies (COT)

Ph.D. Advisor: Prof. Nelson Tansu

- Conducting research in physics, materials, and devices of **III-Nitride semiconductor nanostructures for high-efficiency solid state lighting** applications.

- Extensive MOCVD equipment experience from setting up Veeco P-75 MOCVD facility in Lehigh
- Strong knowledge and hands-on experience in optoelectronic device fabrication equipment such as optical lithography, plasma enhanced chemical vapor deposition (PECVD), electron-beam and thermal metal evaporators, chemical wet etching.
- Strong knowledge and hands-on experience in material characterization such as photoluminescence, X-ray diffraction, atomic force microscopy (AFM), scanning electron microscopy (SEM), transmission electron microscopy (TEM), Hall measurement.
- Planned and liaised with external contractors in setting up facility infrastructure for Lehigh's new high-tech metalorganic vapor phase epitaxy (MOVPE) laboratory.
- **Extensive experience** in working with external vendors such as high-tech material and high-tech equipment suppliers.
- Effectively **negotiated and saved** more than \$25,000 in research expenditure in high-tech material purchase within the first 2 months of work.
- Hands-on experience and in-charge of high-tech equipment commissioning in MOVPE laboratory.
- **Extensive experience** in working with **diverse teams**. Taken **leadership role** as the research leader in working with research teams from Material Science and Chemical Engineering.
- Conducted **high quality research work** recognized through over **50 publications** in international referred conferences and journals, **4 patents**, and **IEEE Photonics Global Best Paper award**.
- Conducted **high quality research work** which was featured in **Laser Focus World** magazine, and proposals written based on conducted research work won over **\$3 million** in future research funds from Department of Energy (DOE), and National Science Foundation (NSF).
- **Vice-President** of the **SPIE (Engineering) Lehigh Student Chapter** in Lehigh University.

**December 2003 – May 2005**                      **Agilent Technologies (Singapore)**

**III-V Epitaxy/ VCSELs Device Engineer**

- In charge of product engineering **GaAs-based** implant **vertical cavity surface emitting lasers (VCSELs)** in Agilent Technologies. Areas involved starts from semiconductor epitaxy process to semiconductor device fabrications.
- Trained in running Aixtron G3 Metalorganic Chemical Vapor Deposition (MOCVD) reactor
- Strong knowledge in secondary ion mass spectrometry (SIMS), and hands-on experience in electrochemical capacitance voltage profiling (ECV).
- Involved in developmental work such as **improving epitaxy wafer yield** and **meeting challenging new product specifications**
- Part of a team working with process engineers as well as my counterparts in Agilent Technologies (San Jose, CA) to optimize the design and performance of the VCSELs.

**June 2003 – December 2003**                      **Denselight Semiconductors (Singapore)**

**Process Engineer**

- In charge of p-contact and n-contact metal evaporation operation for various **InP-based optoelectronic products** such as superluminescence LED, buried-heterostructure laser and CWDM devices.
- Statistical Process Control (SPC) coordinator for wafer fab.

**Awards and Honors**

- **1<sup>st</sup> Prize in Scanning Electron Microscopy Photo Contest**, in 17<sup>th</sup> American Conference on Crystal Growth and Epitaxy (ACCGE), Lake Geneva, Wisconsin, August 2009.
- **Best Paper Award in Nanophotonics**, in IEEE Photonics Global December 2008
  - ❖ **Y. K. Ee**, P. Kumnorkaew, R. A. Arif, H. Tong, J. F. Gilchrist, and N. Tansu, "Optimization and Fabrication of III-Nitride Light-Emitting Diodes with Self-Assembled Colloidal-Based Convex Microlens Arrays," in Proc. of the *IEEE Photonics Global 2008, Nanophotonics Symposium*, Singapore, Republic of Singapore, December 2008.

- **Sherman Fairchild Fellowship** (2007), Lehigh University
- **Phi Beta Delta Honors** (Inducted in 2006), Lehigh University
- **Sigma Xi Scientific Research Society Honors** (Inducted in 2007), Lehigh University
- **1-1-1 Star Award** (winner), Agilent Technologies (October 2004)  
This award was given for playing an important role in a team, in transferring a product from engineering to production mode in shortest time. Product transferred was the **single mode implant VCSEL die**, used in the **world's first true laser mouse**, Logitech MX1000, a completely new mouse platform introduced into the market in 2004 with superior performance over the existing optical mouse.
- **Singapore EDB Photonics Scholarship**, Singapore Economic Development Board (Singapore)
- **People's Defense Force (PDF) Formation Best Soldier of the Month Award**, (January 1999), Singapore, Army Rank: 3<sup>rd</sup> Sergeant  
This award is given to the best soldier of the formation (over 3000 soldiers) who demonstrated **outstanding leadership**, high quality and exemplary military work.

### **Professional Affiliations**

2005 – present, Member, Material Research Society (MRS)  
2006 – present, Member, Institute of Electrical and Electronics Engineers (IEEE)  
2006 – present, Member, IEEE Laser and Electro-Optics Society  
2006 – present, Member, International Society for Optical Engineering (SPIE)  
2006 – present, Member, Optical Society of America (OSA)  
2007 – present, Member, Sigma Xi Research Society

### **Refereed Journal and Conference Publications**

→ Total number of publications: **59** (Full list of publications available on request)

### **US Patents and Invention Disclosures**

1. Nelson Tansu, Ronald A. Arif, and [Yik Khoon Ee](#), "Gallium Nitride-Based Device and Method", Novel techniques to achieve high performance visible LEDs and lasers, US Patent No. 7,518,139; approved on April 14th 2009.
2. Nelson Tansu, Ronald A. Arif, [Yik Khoon Ee](#), and Hongping Zhao, Novel approach using polarization engineering for achieving nitride-based gain media with significant enhancement in radiative recombination rate and optical gain for high efficiency LEDs and lasers. (PCT Application and US Patent Pending).
3. Nelson Tansu, Ronald A. Arif, and [Yik Khoon Ee](#), Novel methods for achieving nitride-based gain media with significant enhancement in radiative recombination rate and optical gain for high efficiency LEDs and lasers. (PCT Application and US Patent Pending).
4. Nelson Tansu, [Yik Khoon Ee](#), James F. Gilchrist, Pisist Kumnorkaew, and Ronald A. Arif, *Novel techniques to achieve large light extraction efficiency of nitride-based LEDs using a low cost and straight forward approach*. (PCT Application and US Patent Pending).
5. Nelson Tansu, Helen M. Chan, Richard P. Vinci, [Yik-Khoon Ee](#), and Jeffrey Biser, *Patterned sapphire substrates and abbreviated MOVPE method for growing epitaxial III-Nitride semiconductor compounds on them*. (US Patent Pending).

### **Journal Reviewer**

1. IEEE Journal of Selected Topics in Quantum Electronics (published by IEEE LEOS)
2. Optical Materials (published by Elsevier Science)
3. IEEE Photonics Journal (published by IEEE LEOS)

## Selected Research Works Featured in Magazine / Newspapers

1. “**Staggered InGaN Quantum Wells Improve LEDs**” in *NewsBreak* section of *Laser Focus World* magazine, vol. 43(11), pp. 17, November 2007.  
[http://www.laserfocusworld.com/display\\_article/311568/12/ARTCL/none/NBrea/Staggered-InGaN-quantum-wellsimprove-LEDs](http://www.laserfocusworld.com/display_article/311568/12/ARTCL/none/NBrea/Staggered-InGaN-quantum-wellsimprove-LEDs)
2. “**LIGHT-EMITTING DIODES: Microlens Arrays Improve the Extraction Efficiency of Nitride LEDs**” in *World News* section of *Laser Focus World* magazine, vol. 44(1), pp. 15, January 2008.  
[http://www.laserfocusworld.com/display\\_article/317036/12/ARTCL/none/News/LIGHT-EMITTING-DIODES:-Microlens-arrays-improve-the-extraction-efficiency-of-nitride-LED](http://www.laserfocusworld.com/display_article/317036/12/ARTCL/none/News/LIGHT-EMITTING-DIODES:-Microlens-arrays-improve-the-extraction-efficiency-of-nitride-LED)
3. “**Student's bright, energy-efficient research recognized**” in *Lehigh News Center Highlight*, March 30th 2009.  
[http://www3.lehigh.edu/News/V2news\\_story.asp?iNewsID=3198](http://www3.lehigh.edu/News/V2news_story.asp?iNewsID=3198)
4. “**Student's Bright, Energy-Efficient Research Recognized**” in *Manufacturing Business Technology*, March 30<sup>th</sup> 2009.  
<http://www.mbtmag.com/articleXML/LN948590853.html>

## References

1. **Prof. Nelson Tansu** (PhD Advisor)  
Associate Professor, Department of Electrical and Computer Engineering  
Center for Optical Technologies  
Lehigh University, Bethlehem, PA 18015, USA  
Email: [Tansu@Lehigh.Edu](mailto:Tansu@Lehigh.Edu)  
Phone: (610) 758-2678, Fax: (610) 758-2605  
Research Group: <http://www.ece.lehigh.edu/~tansu>
2. **Prof. Thomas L. Koch**  
Daniel E. '39 and Patricia M. Smith Director of the Center for Optical Technologies  
Department of Electrical and Computer Engineering  
Lehigh University, Bethlehem, PA 18015, USA  
Email: [tkoch@Lehigh.Edu](mailto:tkoch@Lehigh.Edu)  
Phone: (610) 758-2601
3. **Prof. Helen M. Chan**  
Chair, Department of Material Science and Engineering  
Lehigh University, Bethlehem, PA 18015, USA  
Email: [hmc0@Lehigh.Edu](mailto:hmc0@Lehigh.Edu)  
Phone: (610) 758-5554
4. **Prof. Yujie Ding**  
Class of 1961 Professor  
Department of Electrical and Computer Engineering  
Lehigh University, Bethlehem, PA 18015, USA  
Email: [yud2@Lehigh.Edu](mailto:yud2@Lehigh.Edu)  
Phone: (610) 758-4582
5. **Prof. Richard P. Vinci**  
Professor, Department of Material Science and Engineering  
Lehigh University, Bethlehem, PA 18015, USA  
Email: [vinci@Lehigh.Edu](mailto:vinci@Lehigh.Edu)  
Phone: (610) 758-4581

6. **Dr. Sunil Thomas**  
Epitaxy Engineering Manager  
Philips Lumileds Lighting Company  
Email: [sunil.thomas@philips.com](mailto:sunil.thomas@philips.com)  
Phone: (408) 964-2887
  
7. **Dr. Jeong-Ki Hwang**  
Product and Integration Senior Principle Engineer  
Avago Technologies (formerly Agilent Technologies)  
Singapore III-V Device Operation  
Email: [jeong-ki.hwang@avagotech.com](mailto:jeong-ki.hwang@avagotech.com)  
Office Phone: 1-65- 6215-2746  
Cell Phone: 1-65- 8138-7487  
Office Phone: 1-65- 6215-2746  
Cell Phone: 1-65- 8138-7487