

# Nathan P. Bickel

Senior Optical Engineer

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Innovative, resourceful, and detail-driven individual, with 10+ years of experience in process development for semiconductor based photonic devices. Strong team member with a proven capability as an independent researcher, and a track record for bringing products from conception to customer hand-off.

## QUALIFICATION SUMMARY

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- ◆ Detailed, hands-on knowledge of micro- and nanofabrication processes for III-V semiconductors, dielectrics, metals, and polymers.
- ◆ Originated processes for the integration of multiple functions into more complex photonic devices.
- ◆ Generated alternative fabrication methods, as needed, to realize design goals.

## CAREER HIGHLIGHTS

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### [MACOM](#), Ithaca, NY

**Optical Engineer (Sr)/Development Engineer**

**12/2014-Current**

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- ◆ Integral member of interdisciplinary team, and lead engineer on process development for 10G CWDM, X-GPON DFB laser diode products and platform buildout.
  - ◆ Worked with external clients on custom builds to meet their specific design requirements.
  - ◆ Drove High Power CW, III-V laser diode technology platforms from early stage development through the hand-off to the Product Engineering Team
  - ◆ Trained and mentored junior engineers.

### [BinOptics Corporation](#), Ithaca, NY

**Process Development Engineer**

**6/2011-12/2014**

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- ◆ Mask design for photo- and electron beam lithography.
  - ◆ Monitored and sustained fabrication processes for multiple product lines.
  - ◆ Simplified design of 2.5G FP laser product reducing cost to manufacture while maintaining performance.

CREOL, The College of Optics & Photonics, University of Central Florida, Orlando, FL

**Postdoctoral Research Scientist**

**8/2010-12/2010 (Short-term Contract)**

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- ◆ Construction of nonlinear optical isolators as key part of a multi-institution project.
- ◆ Electron beam processing of photolithographic masks and nano-imprinting masters.
- ◆ Oversaw all day-to-day lab and cleanroom operations; mentored graduate students.

**Graduate Research Assistant**

**8/2002-8/2010**

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- ◆ **Photonic Device Development (III-V Wafer Materials):**
  - ◇ Originated method for suppression of vacancy disordering in quantum dots. Required fewer process steps vs. existing methods which reduced cycle time and cost.
  - ◇ Leveraged challenges posed by equipment losses to establish waveguide fabrication method for semiconductor devices now employed group-wide.
  - ◇ Addressed design issues and realized compact, multimode, all-optical switches.
  - ◇ Modeled photonic integrated circuits using beam propagation analysis software.
  - ◇ Development of MQW-based beam steering devices, with steering controlled through the creation of virtual waveguides. Provided an alternative to component cascading.
  - ◇ Tailored dry etching and PECVD processes to meet device fabrication requirements.
- ◆ **Nanostructure/Nano-Device Fabrication:**
  - ◇ Solved challenges in creating sub-100 nm, high aspect ratio, nanopillar arrays.
  - ◇ Conducted studies on nanopore formation in semiconductors for device application.

**Graduate Research Assistant**

**8/2002-8/2010**

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- ◆ **Cleanroom Operations:**
  - ◇ All day-to-day supervision – Established standardized training process, wrote user and equipment manuals, initiated push to bring facility in line with EHS regulations, and dealt

**OTHER SKILLS**

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- ◆ **Software Tools:**
  - ◇ BeamPROP/FullWAVE, TFCalc, L-Edit, KLAYOUT, AutoCAD, Adobe Photoshop, and Microsoft Office Suite.
- ◆ **Equipment:**
  - ◇ Plasma enhanced chemical vapor deposition (PECVD), reactive ion etching (RIE), ICP-RIE, rapid thermal annealing systems, and diffusion furnaces.
  - ◇ Scanning electron microscope, atomic force microscope, and micro-profilometers.

- ◇ Thermal evaporation and electron beam evaporation systems for metals and dielectrics.
- ◇ Photolithography, electron beam lithography, and mask aligner technology.
- ◇ Optical spectrum analyzers, photodetectors, optical circulators, and power meters.

**ACADEMIC HISTORY**

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[CREOL, The College of Optics & Photonics](#), University of Central Florida, Orlando, FL

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◆ **Ph.D. in Optics** ■ 2010

**Advisor:** Dr. Patrick LiKamWa

**Dissertation Title:** *“Electro-Optical and All-Optical Switching in Multimode Interference Waveguides Incorporating Semiconductor Nanostructures”*

[Institute of Optics](#), University of Rochester, Rochester, NY

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◆ **M.S. in Optics** ■ 1999

■ **B.S. in Optics (w/distinction)** ■ 1998

**REFERENCES**

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Available Upon Request

**Publication & Patent List**

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Available Upon Request