

Dibyendu Dey

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PROFILE

PhD candidate (finish in December, 2011) at the department of Electrical Engineering and Computer Science (EECS) at Northwestern University with over 5 years experience in design, simulations, fabrication and testing in semiconductor optoelectronics devices. Seeking a position in the semiconductor industry that will provide challenging tasks in the area of device research and process development

EDUCATION

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| PhD, Electrical Engineering and Computer Science Northwestern University, Evanston, IL, USA | Dec, 2011 (Expected) |
| MS, Electrical Engineering and Computer Science Northwestern University, Evanston, IL, USA | 2008 |
| Integrated MSc (BS & MS), Physics Indian Institute of Technology, Kanpur, India | 2005 |

PROFESSIONAL EXPERIENCE

Research Assistant, Northwestern University. Bio-Inspired Sensor & Optoelectronics Laboratory (BISOL). Adviser: Prof. Hooman Mohseni **Mar'07 – Present**

- Novel Quantum Cascade Lasers(QCL)
 - Designed and developed multiple fabrication steps for the fabrication of standard QCL
 - Demonstrated injectorless QCL with record lowest voltage defect $\sim 30\text{meV}$
 - Demonstrated improved thermal performance by manipulating injector region of the QCL
- Plasmonic Optical Antenna Integrated QCL
 - Performed 3D-FDTD simulations to design a mid-Infrared optical antenna
 - Fabricated optical antenna integrated QCL using Focused Ion Beam milling
 - First demonstration of composite material-based optical antenna (single and coupled nanorod)
 - Integrated Microfluidics over the antenna integrated to build chip-scale mid-IR bio-sensor
- Apertureless Near-field Scanning Optical Microscope (a-NSOM)
 - Built an a-NSOM based on a commercially available Atomic Force Microscope (AFM)
 - First demonstration of transmission-based a-NSOM
 - Performed near-field study of the antenna integrated QCL
- Optical force measurement
 - Simulated optical force generated near plasmonic antenna
 - Measured optical force in the near field region of the optical antenna using the a-NSOM set-up
- Nano-sphere Photolithography (NSL)
 - Developed a set-up to deposit silica/polystyrene micro/nano-sphere on photoresist
 - Developed a photolithographic process to generate large uniform array of nanoholes and nano-pillars using standard UV source (wavelength $\sim 400\text{nm}$)
- Quantum-well-infrared photodetector (QWIP) and type-II Photodetector
 - Worked on developing a wavelength tunable QWIP
 - Developed loping nano-injector based type-II photodetector

Summer Intern, Intel Corporation, Santa Clara, USA. Photonic Technology Labs (PTL)

Jul'09-Dec'09

Managers: Yimin Kang , Mike Morse, Mario Paniccia.

- Development of 40Gb/s Si-Ge Waveguide Avalanche Photodiode
 - Demonstrated a fully functional monolithically integrated variable optical attenuator (VOA) integrated with Si/Ge waveguide avalanche photodiode (WGAPD)
 - Comprehensive device characterization for Si-Ge waveguide APD devices including I-V, C-V, analysis of all kind of optical losses, Bandwidth measurement and metrology studies
 - Solved various processing issues (like etching, implantation etc.) using Sentaurus TCAD

Summer Intern, University of Paderborn, Germany. Department of Optoelectronics

May'04-Aug'04

& Photonics Adviser: Prof. Wolfgang Sohler

- Development of Erbium doped LiNbO₃ Ring Laser at 1550nm
 - Built a set-up to measure the output and resonance characteristics of the laser cavity
 - Performed spectral analysis, power measurement and noise analysis for the device

Undergraduate Research Assistant, IIT Kanpur. Department of Physics.

Aug'04-May'05

Adviser: Prof. R. C. Budhani.

- Developing a process to generate nanoparticles cost-effectively
 - Built a novel set-up to prepare nanoparticles by laser ablation in solution
 - Generated nanoparticle size was characterized by photoluminescence and it matched with the theoretical calculations

TECHNICAL SKILLS

- Device Fabrication

Class 1000 clean room experience (>15,000 hrs) in PECVD, RIE, Wet etching, Photolithography, Ellipsometry, Rapid thermal annealing (RTA), Sputtering, e-beam evaporation, Anodization, Wire bonding, Lapping and polishing, Fiber cleaving and splicing
- Device Characterization

AFM (Agilent 5400), SEM (Hitachi 4800), Low temperature probe station, Cryostat, Lock-in amplifier (SR 850), Low noise current preamplifier (SR 570), Piezoelectric controller, Semiconductor parameter analyzer (HP 4156B), High speed oscilloscope, Optical spectrum analyzer (Agilent 86146B), Cryostat, FTIR (Nicolet 8700), Pulse Generator (Avtech), LCR meter (Agilent 4285A), Power meter (Keithley 2400), Device automation using Labview and Matlab instrument control toolbox.
- Software Skills

C, Matlab, Mathematica, Comsol Multiphysics (FEM software), Sentaurus TCAD, Labview, PSpice, Lumerical (FDTD software)

SELECTED JOURNAL PUBLICATIONS

1. J.Kohoutek, D. Dey, A. Bonakdar, R. M. Gelfand, A. Sklar, O. Memis and H. Mohseni. "Opto-mechanical force mapping of deep sub-wavelength plasmonic modes" Nano Letters 11,3378 (2011)
2. R. Gelfand, D. Dey, J.Kohoutek, A. Bonakdar, S.C.Hur, D. Dicarolo and H. Mohseni."Towards an integrated Chip Scale Plasmonic Biosensor" OPN Optics and Photonics News 22, .32 (2011). Featured as a Cover story April'11 issue.

3. D. Dey, J.Kohoutek, R. Gelfand, A. Bonakdar and H. Mohseni."Composite nano antenna integrated with Quantum Cascade Laser "IEEE Photonics Technology Letter 22, 1580 (2010). Cover Article Nov-Dec issue
4. D. Dey, J.Kohoutek, R.Gelfand, A. Bonakdar and H. Mohseni."Metal-dielectric-metal nano antenna integrated with Quantum Cascade Laser "Optics Letter 35, 2783 (2010). Selected for Virtual J. Bio. Med. Opt. vol 5(9) (2010)
5. D. Dey, W. Wu, O.G. Memis and H. Mohseni " Injectorless Quantum Cascade Laser with low voltage defect and improved thermal performance grown by metal-organic chemical vapor deposition ". Applied Physics Letter. 94,081109 (2009)

SELECTED CONFERENCE PROCEEDINGS

1. D. Dey, J.Kohoutek, R. Gelfand, A. Bonakdar and H. Mohseni."A new generation infrared bio-sensor based on quantum cascade laser " SPIE Proceeding. vol.8034, 803404 (2011) (invited)
2. D. Dey, J.Kohoutek, R. Gelfand, A. Bonakdar and H. Mohseni."Integration of plasmonic antenna on the facet of a quantum cascade laser for chip-scale molecular sensing" IEEE Sensors Conference pp.454-458(2010)
3. D. Dey, R. Gelfand, J.Kohoutek, A. Bonakdar and H. Mohseni."Near-field imaging of a plasmonic photonic crystal patterned on the facet of a quantum cascade laser" Proc. SPIE, vol. 7757, pp 77573H (2010)
4. D. Dey, R. Gelfand, J.Kohoutek, A. Bonakdar and H. Mohseni."Quantum cascade laser integrated with plasmonic antenna" Proc. SPIE, vol. 7789, pp 77890L (2010)
5. D. Dey, W. Wu, O.G. Memis and H. Mohseni."Design and simulations of electrically tunable quantum dot cascade laser" Proc. SPIE, Vol. 7406, 74060Q (2009)
6. D. Dey, W. Wu, O.G. Memis and H. Mohseni. "Injectorless quantum cascade Laser with very low voltage defect grown by metal-organic-chemical vapor deposition" IEEE Lasers and Electro-Optics Society, LEOS pp.800-801, 9-13 Nov. (2008)

PROFESSIONAL ACTIVITIES

- Student Member of SPIE, IEEE, IEEE-LEOS, APS, OSA
- Assisted proposal writing for DARPA, NSF, SBRI, ISEN-Northwestern.
- Reviewer of Optics Letter, Applied Physics Letter, Optics Express, JVST-B
- Officer of SPIE Northwestern Chapter

AWARDS & HONORS

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| 2011 | SPIE Scholarship in Optics and Photonics |
| 2011 | Terminal Year Fellowship from Northwestern University |
| 2011 | Audience Choice Award for best presentation at Applied Research Day, InNuvation - Entrepreneurship and Innovation at Northwestern |
| 2010 | 2 nd Best Poster Presentation at EECS Open-House, Northwestern University |
| 2006 | Huang Fellowship from Northwestern University |
| 2005 | Young Researcher Best Paper Award (3 rd best paper) at ECIO, Grenoble, France |
| 2004 | Received Honorarium prize, University of Paderborn, Germany |