

# Nirajan Mandal

San Diego, CA  
nirajan.mandal@hotmail.com

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## EDUCATION

- **Purdue University**, West Lafayette, IN **2010-2018**  
Ph.D., Department of Physics and Astronomy.
- **Kenyon College**, Gambier, OH **2006-2010**  
B.A. Physics and Mathematics with concentration in scientific computing.

## WORK EXPERIENCES

- **Process Engineer**, Chemical mechanical planarization (CMP) **2018 - Present**  
Intel Corporation, Portland, Oregon
- **Lecturer**, Purdue University for General Physics (PHYS 221) **Summer 2016**
- **Webmaster** for <http://peregrinations.kenyon.edu> **2008-2010**  
Online journal of medieval art and architecture
- **Tutor**, Kenyon College (PHYS110, PHYS135 and C<sup>++</sup> programming) **2008-2010**

## TECHNICAL SKILLS

- **Programming/ Coding:** C<sup>++</sup> (data structure and MPI), Python (Numpy, Pandas, Scikit-learn, OpenCV), JMP, Matlab, LabVIEW, HTML, L<sup>A</sup>T<sub>E</sub>X
- **Artificial intelligence:** PyTorch, machine learning (regression, K-nearest neighbours, support vector machine, neural network, Tensorflow.js)
- **Data Analysis/ Visualization:** Statistical Process Control (SPC), SQL-PathFinder, JMP, OriginPro, Igor, Maple, Mathematica, Minitab, gnuplot, Matplotlib
- **Design Software:** AutoCAD (fundamental), Photoshop, GIMP, Final Cut Pro., Audio Pro.
- **Optical Characterization:** Kerr rotation, micro-Raman spectroscopy, Variable Angle Spectroscopic Ellipsometer (VASE), infrared (IR) VASE, PhotoLuminescence (PL), absorption spectroscopy, optical tweezers, confocal microscopy
- **Other Characterization:** X-Ray Diffraction (XRD), electrical transport, Atomic-Force Microscopy (AFM), Electron Spin Resonance (ESR), Electron Nuclear Double Resonance (ENDOR), Vibrating Sample Magnetometer (VSM), Variable Temperature Insert (VTI)
- **Instrumentation:** Optical assembly/design, laser operation and maintenance, cryogenics (Liquid N<sub>2</sub> and He), high vacuum systems, Printed Circuit Board (PCB) design, RF electronics, machine shop (lathe and mill), light detection

## PROGRAMMING COURSES

- **MATH 218:** Data structures and program design (C<sup>++</sup>) **2008**
- **PHYS 218:** Dynamical system in scientific computing (C<sup>++</sup>) **2008**  
Solved ordinary and partial differential equations to simulate natural phenomena
- **SCMP 401:** Scientific computing seminar (C<sup>++</sup>) **2009**  
Ran simulations on a supercomputer using Message Passing Interface (MPI)
- Proficient in **LabVIEW**. Used for data collection and instrument control
- **Self taught:** Machine learning, JMP, Matlab, Python and HTML

## RESEARCH EXPERIENCES

- Designed, assembled and developed an optical Kerr rotation system. The setup is used to explore properties of topological insulators, magnetic thin films and heavy metals. Measurements can also be done at low temperature and low pressure. (Purdue University)
- Responsible for maintaining, troubleshooting and training new users for our micro-Raman spectroscopy facility. (Purdue University)
- **Kenyon College:** Responsible for operating and maintaining Frank C. Peiris's thin film optics lab. The major instruments in the lab were Variable Angle Spectroscopic Ellipsometer (VASE) and infrared (IR) VASE (2007-2010).
- **Ohio State University:** Upgraded ESR instrument (EMXplus by Bruker) to have angular dependence measurement capability. Used this to measure hyperfine splitting in  $P_1$  center defects in diamond. Mentor: P. Chris Hammel, Summer Research Opportunity Program (SROP) 2009.

## PUBLICATIONS

1. W. Park, X. Li, **N. Mandal**, X. Ruan, and Y. P. Chen, "Compressive mechanical response of graphene foams and their thermal resistance at the interface", Applied Physics Letters (APL) Materials, (2017)
2. K. Ramadoss, **N. Mandal**, X. Dai, Z. Wan, Y. Zhou, L. Rokhinson, Y. P. Chen, J. Hu, and S. Ramanathan, "Sign reversal of magnetoresistance in perovskite nickelates by electron doping", Phys. Rev. B, 94, 235124 (2016)
3. **N. Mandal**, F. C. Peiris, O. Maksimov and M.C. Tamargo, "Far-infrared dielectric functions and phonon spectra of  $\text{BexZn}_{1-x}\text{Te}$  alloys determined by spectroscopic ellipsometry", Solid State Comm., 149, 1698 (2009)
4. S. Wong, O. Kiowski, M. Kappes, J. K. N. Lindner, **N. Mandal**, F. C. Peiris, G. A. Ozin, M. Thiel, M. Braun, M. Wegener, and G. Freymann, "Spatially localized photoluminescence at 1.5 micrometers wavelength in direct laser written optical nanostructures", Adv. Material, 20, 4097 (2008)

## AWARDS & HONORS

- 1<sup>st</sup> place in graduate student poster presentation **2015**  
Organized by Nanotechnology Student Advisory Council (NSAC), Purdue University, IN
- Physics ingenuity prize, Kenyon College, OH **2009**  
Awarded by the department for creating a system to monitor online pressure of a vacuum chamber in the lab
- John H. Dunlap IV Scholarship, Kenyon College, OH **2008**  
Awarded to two students by mathematics department for demonstrating excellence in programming and/or use of computer applications

## LEADERSHIP

- **President** of Nepali Society at Purdue University (NEPSAP) **2013-2014**  
Oversaw and organized educational and cultural events
- **President of student government**, Budhanilkantha School, Kathmandu, Nepal **2003-2004**  
Liaison between students, teachers and administration of the school

**LANGUAGES:** English, Nepali, Maithali (Native) and Hindi

**HOBBIES:** Raspberry Pi, Arduino, photography, astrophotography, volleyball and classical music