

Dr. Parveen Kumar

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EDUCATION

- **Ph. D. (Physics)** University of Cincinnati, Cincinnati, OH (**GPA: 3.93/4.00**) July, 2013
Condensed Matter Physics (Experimental)
- **Master of Technology (Materials Engineering)** Indian Institute of Technology, Kanpur, India January, 2006
- **Master of Science (Physics)** Panjab University Chandigarh, India June, 2003
- **Bachelor of Science**, Himachal Pradesh University, Shimla, India June, 2001

PROFESSIONAL EMPLOYMENT

- **Summary:**
 - ✓ **7 years' teaching experience at the University Level** Undergraduate Physics. 20 hours per week equivalent to 3.5 years.
 - ✓ **2 years' experience of online/web based teaching** (Full time)
 - ✓ 3 years' postdoctoral experience including mentoring graduate/undergraduate research.
- **Post-doctoral Researcher**, School of Natural Sciences, University of California, Merced, CA; **June, 2016- Current**
Research: Light matter interactions, Nanostructured Materials, Coupled Quantum Systems, and Quantum Information. Focus on photon, phonon, and charge interactions in Stranski-Krastanov quantum dot molecules using optical spectroscopy. Trained and mentor graduate and undergraduate students.
- **Instructor**, United Software Group, Dublin, OH; August, 2014- May, 2016
Two-year online teaching experience. Designed online SAS courses with live demonstrations, real time project exposure, instructed multiple batches, and provided support to finish project on time. Developed and tested SAS Software programs to complete complex Finance and Bio-statistical analyses identified in statistical analysis.
- **Post-doctoral Researcher**, Department of Electrical and Computer Engineering, The Ohio State University, Columbus, OH; August, 2013- June, 2014
Research: Focus on electrically active defects in GaN high electron mobility transistors (HEMTs) as well as basic materials research of semiconductors. Trained and mentor graduate and undergraduate students.
- **Teaching and Research Assistant**, Department of Physics, University of Cincinnati, Cincinnati, OH; September, 2006-July, 2013
7 Years teaching experience at University Level Undergraduate Physics. Instructed and taught undergraduate Physics courses. Research: Explored optoelectronics properties of semiconductor nanowires, nanosheets, and nanostructures using optical spectroscopy and transport characterization techniques.
- **Research Associate**, ACMS, Indian Institute of Technology, Kanpur (India); January, 2006 – August, 2006
Research: Contributed to the development of sol-gel technique to fabricate multilayer electro ceramic thin films having high dielectric constant

TEACHING EXPERIENCE

- **Instructor:** United Software Group, Dublin, OH; August 2014 to May 2016
SAS Instructor: Certified SAS programmer, Online SAS courses, designed online SAS courses with live demonstrations and real time project exposure. These classes include students from throughout the world.
- **Preparing Future Faculty (PFF)**,
University of Cincinnati; certificate awarded December, 2012

(Two courses on Effective Teaching Colloquium, five workshops, two reading groups as a participant and a third as a leader and 40-hour in class mentoring experience)

Physics Department, University of Cincinnati, Cincinnati, OH

- **College Physics Labs:**

Summer 2007, Fall 2007, Spring 2008, Summer 2009, Winter 2011, Fall 2012

- **College Physics recitations (algebra based):**

Summer 2007, summer 2008, summer 2009, winter 2011, winter 2012

- **General Physics Labs:**

Winter 2008, winter 2009, spring 2009, winter 2010, spring 2010

- **General Physics recitations (calculus based):**

Winter 2008, winter 2009, spring 2009, spring 2011

- **Leader Physics Learning Center:** spring 2013

ACADEMIC HONORS

- **Ten publications in reputed international journals.**

***Seven publications in preparation/submission process to Applied Physics Letters and Nano Letters, and Applied Physics Express.

- **40+** contributed papers and presentations at professional conferences and meetings

- Leadership Award Nomination Reviewers, University of California, Merced

- **University of Cincinnati:**

- University Graduate Scholarship (Fall 2006 to Spring 2013)
- Research Assistant at University of Cincinnati (Fall 2006 to Spring 2013)
- Teaching Assistant at University of Cincinnati (Fall 2006 to Spring 2013)
- Twelve presentations at intra-university meetings
- Mary J Hanna Fellowship (2012)
- Henry Laws Research Fellowship (summer 2010 and summer 2012)
- URC Graduate Summer Research Fellowship (summer 2010 and summer 2012)
- Best Poster Award in Engineering & Physical Sciences, Uni. of Cincinnati, Cincinnati, OH (2011).
- 2nd prize winner in physics departmental poster competition, Uni. of Cincinnati, Cincinnati, OH (2010)

- **Indian Institute of Technology, Kanpur (India):**

- Govt. of India, MHRD scholarship (2003-2006)
- January 2004-December 2006 Graduate research assistant
- January 2006- June 2006: Research scientist
- GATE (Graduate Aptitude Test in Engineering) Physics, India, 2003

TEACHING WORKSHOPS

- Course redesign series talk: Dr. Robin Lightner, Uni. of Cincinnati
- Modeling Instruction workshop: Dr. Eirc Brewster, Florida International Uni.
- Creating Assignments for Large Enrollment Classes: CET&L, Uni. of Cincinnati
- Course Design Series: Dr. Brenda Refaei and Dr. Rita Kumar, Uni. of Cincinnati
- Engaging Large Classes through Clickers: CET&L, Uni. of Cincinnati
- Learning From Each Other's Craft: Prof. Dan Bernstein, Uni. of Kansas
- Teach Me To Teach (Pedagogical Preparation Seminar): CET&L, Uni. of Cincinnati
- Creating a Semester Teaching Syllabus: CET&L and Dr. Kathy Rowell, Uni. of Cincinnati

EXPERIENCE and RESEARCH SKILLS

- **Fabrication:** 6+ years' experience in *cleanroom fabrication* including UV Photolithography, e-beam lithography, nano-imprinter lithography, Mask layout, Profilometer, Wet etch, Dry Plasma etch (ICP RIE), Thermal/E-beam evaporation (Deposition), Rapid Thermal Processing, Metallization, Wire Bonder etc.

- **Characterization:** 8+ years' experience in nanomaterials, nanostructures and quantum dots characterizations including optical spectroscopy, electrical characterization, Raman spectroscopy, AC/DC measurements etc.
- **Imaging and Structural Characterization:** Hands-on experience on optical microscopy, atomic force microscopy, Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), photocurrent spectroscopy etc.
- **Material Synthesis and sample preparations:** Sol-gel processing, Solid state processing, mechano-chemical synthesis, Melt quenching techniques, Thin Film preparation using Spin coating, Plasma deposition, and Thermal evaporation etc.
- **Reliability Testing:** 1 year experience on reliability and electrical testing on GaN based high power HEMTs using advanced deep level transient spectroscopy (DLTS), deep level optical spectroscopy (DLOS), gate and drain lag transient spectroscopy, Pulsed IV, and DC characterization techniques. Hands on experience on Keithley semiconductor device analyzer (SDA)
- **Lasers:** Extensive experience on cw Ar⁺ laser, self-mode-locking solid state Ti:Sapphire laser, generation of white light supercontinuum using nonlinear fiber etc.
- **Hands-on experience** on vacuum systems, cryogenics liquid helium cooled optical cryostats, design and fabrication of parts using lathe and milling machine tools, as well as with designing mounts for optical components and positioning equipment
- **Computer Skills:** 4+ years' experience on **LabView**, 1+ year experience on **Statistical Analysis Software (SAS)**, excellent knowledge of Mathematica, Origin, MS office package etc. **SAS Certified base programmer for SAS 9**, SketchUp, AutoCAD
- **Other Familiar Techniques:** X-rays, Differential scanning calorimetry (DSC), thermal analysis (TGA/DTA), impedance spectroscopy etc.

MAJOR ACCOMPLISHMENTS

- Accomplished extensive research on optoelectronic properties and electronic structure of II-VI and III-V semiconductor nanostructures.
- **Designed experimental setups for multi-purpose experiments.** For example designed experimental setup to perform Photocurrent spectroscopy, spatially-resolved photocurrent imaging, polarized photocurrent spectroscopy, Raman scattering, photoluminescence, photoluminescence excitation, and polarized photoluminescence on one system, and built system to generate white light supercontinuum using mode-locked Ti:S laser and nonlinear fiber etc.
- Integrated and built the setup using LabVIEW for Princeton Instruments (PI) LC-CCD, PI Tri-Vista spectrometer, Lakeshore Temperature controller, Toptica tunable diode lasers, Meadowlark liquid crystal retarders and Thorlabs power meter.
- Built **LabView ActiveX Controls** for instrument control embedded in software packages which interface with a variety of equipment's such as Dilor XYZ Spectrometer, Newport spectrometer, CCD Detector, Stepper Motor Drive, and Lock-In Amplifiers etc.
- Developed and optimized clean room processes to fabricate different kinds of contact (Schottky or Ohmic) on III-V and II-VI semiconductor nanomaterial.
- Developed CdS nanosheet devices to perform autocorrelation measurements to measure pulses in femtosecond lasers
- Design and test for DC/AC measurements, reliability testing on high power HEMTs, including advanced deep level transients spectroscopies.

PROFESSIONAL DEVELOPMENT

- Reviewer for Journal Materials Chemistry & Physics, Journal of Materials Science: Materials in Electronics, Recent Patents on Materials Science, Materials Letters, Journal of Alloys and Compounds, Applied Optics, Optics Letters, Journal of the Optical Society of America B, Journal of Physics and Chemistry of Solids, Journal of Luminescence; **Reviewed 30+ journal papers**
- Materials Letters certificate of reviewing in recognition made for the journal, January 2016
- Materials Chemistry and Physics, certificate of reviewing in recognition made for the journal, August 2016
- Editorial board member, International Journal of Advances in Engineering & Scientific Research.
- Session Chair, Novel Photonic and Optical Phenomena in Nanostructured Materials session, APS March meeting 2017
- Member Materials Research Society (MRS) and American Physical Society (APS)
- Member APS sorter committee
- University Student Executive committee member for all Science's departments at Panjab Uni., Chandigarh
- Physics department student representative (2002-2003) at Panjab Uni., Chandigarh (India)
- Judge, Southwest Ohio District Science & Engineering Expo (SEE), Uni. of Cincinnati (2010 to 2015)
- Judge, Science and Engineering Fair of Northern Kentucky (SEFNK), 2012-2015

PUBLICATIONS

1. Stabilization of cubic crystalline phase in hybrid perovskite quantum dots via surface energy manipulation, Som Sarang, Sara Bonabi, **Parveen Kumar**, Edwin Betady, Vincent Tung, Michael Scheibner, Jin Zhang, and Sayantani Ghosh, *J. Phys. Chem. Lett.* **8**, 5378 (2017), I performed Raman measurements and participated in design of experiments, writing manuscript and discussion.
2. Proton irradiation-induced traps causing V_T instabilities and RF degradation in GaN HEMTs, A. Sasikumar, Z Zhang, **P. Kumar**, EX Zhang, DM Fleetwood, RD Schrimpf, P Saunier, C Lee, SA Ringel, AR Arehart, *Reliability Physics Symposium (IRPS)*, 2015 IEEE International, 2E.3.1 - 2E.3.6, (2015), I performed DLTS measurements and participated in design of experiments, writing manuscript and discussion.
3. Comparison of Irradiation and Electrical Stressors on AlGaN/GaN HEMT Reliability, A. R. Arehart, A. Sasikumar, Z. Zhang, **P. Kumar**, B. Poling, G. D. Via, E. Heller, D. M. Fleetwood, R. D. Schrimpf, P. Saunier, C. Lee, and Steven A. Ringel, in *Govt. Microcircuit Appl. Critical Tech. Conf. (GOMACTech)*, 2015. I performed DLTS measurements and participated in design of experiments, writing manuscript and discussion.
4. Tuning Band Energies in a Combined Axial and Radial GaAs/GaP Heterostructure, Y. Wang, **P. Kumar**, L. M. Smith, H.E. Jackson, J. M. Yarrison-Rice, C. Pryor, J. H. Kang, Q. Gao, H. Hoe Tan, C. Jagadish, *MRS proceedings* 1659, (2014), I performed photocurrent measurements and participated in design of experiments, writing manuscript and discussion.
5. Nonlinear Two-Photon Photocurrent Spectroscopy of CdS Nanosheets, **P. Kumar**, A. Wade, H.E. Jackson, L. M. Smith, J. Yarrison Rice, Young-Jin Choi, Jae-Gwan Park, *MRS proceedings* 1439, (2012)
6. Photocurrent spectroscopy of single CdS nanosheets: Valence band structure and Two photon absorption, **P. Kumar**, A. Wade, H.E. Jackson, L. M. Smith, J. Yarrison Rice, Young-Jin Choi, Jae-Gwan Park, *Applied Physics Letters* **98**, 143102 (2011)
7. Dielectric and optical properties of $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ thin films containing Ag nanoparticles, **P. Kumar** and D. C. Agrawal, *Materials Letters* **64**, 350–352, (2010)
8. Room Temperature Photocurrent Spectroscopy of Single Zincblende and Wurtzite InP Nanowires, A. Maharjan, K. Pemasiri, **P. Kumar**, A. Wade, L.M. Smith, H.E. Jackson, J.M. Yarrison-Rice, A. Kogan, S. Paiman, Q. Gao, H.H. Tan, and C. Jagadish, *Applied Physics Letters* **94**, 193115 (2009), I fabricated devices, helped in photocurrent measurements and participated in design of experiments, writing manuscript and discussion.
9. Effect of calcium variation on dielectric response of the sol-gel derived $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ thin films, Deepam Maurya, **Parveen Kumar**, Devendra P. Singh and D.C. Agrawal, *Indian journal of engineering & materials sciences*, **15**, 107

(2008), I performed prepared samples, and performed some dialectics measurements and participated in design of experiments, writing manuscript and discussion.

10. Ion transport study of mechanically-milled amorphous $\text{AgI-Ag}_2\text{O-V}_2\text{O}_5$ fast ionic conductors (a-FICs), **Parveen Kumar** and K. Shahi, *Indian Journal of Pure & Applied Physics*, **45**, 44 (2007)

Publication in progress:

- 1.) Spectral broadening of optical transitions in InAs/GaAs coupled quantum dot pairs, **P. Kumar**, C. Czarnocki, C. Jennings, J. Casara, A. Jacobs, A. S. Bracker, B. C. Pursley, D. Gammon, S. E. Economou, S. G. Carter and M. Scheibner, *communicated to APL*
- 2.) Transient Stokes Photon Interference Reveals Intrinsic Phonon Dephasing Dynamics in van der Waals Materials, Liuyang Sun, **Parveen Kumar**, Junho Choi, Sebastian Roesch, Kha Tran, Joshua Casara, Edurado Priego, Yu-Ming Chang, Galan Moody, Kevin Silverman, Michael Scheibner, Virginia O. Lorenz, Xiaoqin Li, *communicated to PRL*
- 3.) Optical charging of coupled quantum dots, Cyprian Czarnocki, Joshua Casara, **Parveen Kumar**, Cameron Jennings, Mark Kerfoot, Andrew Jacobs, Samuel Carter, Daniel Gammon, and Michael Scheibner, *communicated to APL*
- 4.) The charge fluctuation-free spectroscopy of InAs/GaAs quantum dot molecule using two-laser excitation (*in preparation for PRL*)
- 5.) Scanning Photocurrent Microscopy on a Single CdS Nanosheet: Effects of Contact (*in preparation for APL*)
- 6.) Two photon absorption photocurrent spectroscopy and autocorrelation measurements of single CdS nanosheets (*in preparation for APL*)
- 7.) Strain Distribution and Electronic Band Structure Measurements by Raman Scattering and Photocurrent Spectroscopy in GaAs/GaP Axial Heterostructure Nanowire (*in preparation for Nano Letters*)

RESEARCH SUMMARY

PhD project: Optoelectronic Investigation of Single CdS Nanosheets and Single GaP/GaAs Nanowire Heterostructures; Supervisor: Prof. Leigh Smith and Prof. Howard Jackson, Uni. of Cincinnati

My PhD research involves comprehensive characterization of II-VI and III-V semiconductor nanostructures, using electrical transport combined with optical spectroscopy. We use three different types of measurements including electrical transport, photo-luminescence, and Raman spectroscopy to extract important semiconductor/material parameters, for instance, electronic band structures, band structure symmetries, absorption coefficients, photosensitivities, polarization sensitivities, mobilities and crystallographic orientation etc. This work involves extensive use of cleanroom fabrication facilities to make different types of electrical contacts (Ohmic or Schottky) on top of nanostructures.

We use photocurrent spectroscopy to characterize single semiconductor CdS nanosheet and GaP/GaAs nanowire heterostructure devices. Scanning photocurrent microscopy is used to acquire 2D photocurrent images of these nanostructures, which can illuminate both the transport process and the nature of the contacts (Ohmic or Schottky). Photocurrent spectroscopy is a straightforward but powerful tool to characterize the electronic structure of these nanodevices. These techniques have been used to probe the electronic band structures of CdS nanosheets with polarization analysis that can illuminate their symmetries. Similarly, using pulsed sub band-gap excitation of CdS NS devices one can extract the non-linear two photon absorption coefficient. As a separate example, photocurrent spectroscopy has been used to determine the electronic band structure of a strained GaP-GaAs nanowire axial heterostructure, where photoluminescence or excitation measurements were not possible. This introduced stress/strain can be used to modify the energy band gap in semiconductors, an example of strain engineering. These various examples show the advantages of combining optical spectroscopy with transport.

Spin-mechanical interactions of quantum mechanical systems, Supervisor: Prof. Michael Scheibner, University of California, Merced

This project involves the investigation of spin-mechanical interactions of quantum mechanical system for gravity gradiometer application and to improve gravity-based detection of shielding materials

such as concealed nuclear materials. Gravity gradiometer detects tiny differences in the earth's density to reveal the geologic structures and used for a variety of applications, including natural resource exploration, navigation and military operations. An atomic interferometry based quantum gravity gradiometer are even more sensitive (4×10^{-9} g/Hz^{1/2}) for high resolution mapping of mass distribution of interior of the Earth or other astronomical bodies. In this project we will explore the potential of quantum controlled sensitivity of QD optical transitions to detect and enhance the sensing of gravitationally induced motion via spin-phonon coupling. The central piece of this study is to enhance the sensing capability by favoring the quantum tunneling within two coupled quantum dots using structural engineering, electric, magnetic and optical fields and couple the quantum states to the phonon excitations. One example of such system is the recognition of non-dissipative and coherent phonons interaction with photons and charges in coupled QDs through the formation of molecular polaron. The realization of such highly sensitive system requires implementations of highly spin-sensitive optical spectroscopy techniques, such as Ramsey-fringes and Raman spin-flip spectroscopy and boon to understand the fundamental physical constants.

Postdoctoral project: Impact of proton irradiation on traps and RF and DC characteristics in GaN

HEMTs, Supervisor: Prof. Steve Ringel, The Ohio State University

In this work, commercial X-band AlGaIn/GaN-HEMTs subjected to increasing fluences of 1.8 MeV proton irradiation exhibited a significant reduction in RF small signal gain up to ~ 1.2 dB at the highest fluence. Because the proton irradiation causes displacement-damage defects, gate-controlled constant-current deep level transient spectroscopy (CLD-DLTS) was applied to the HEMTs before and after irradiation to probe defects under the gate. Two primary traps at $E_C-0.57$ eV and $E_C-0.72$ eV were revealed which were responsible for large threshold voltage (V_T) shifts ($\sim 50-200$ mV). The $E_C-0.57$ eV trap has been shown to be a GaN bulk trap that causes degradation in under life test. The $E_C-0.57$ eV trap is insensitive to proton irradiation. The $E_C-0.72$ level, in contrast, shows a strong dependence on proton irradiation increasing 3.1x with a fluence of 1×10^{14} cm⁻² to cause a ~ 150 mV V_T shift. These results demonstrate the impact of individual traps in specific areas of the device (under the gate in this case) causing large V_T instabilities. Proton irradiation leads primarily to an increase in $E_C-0.72$ eV and deeper levels, increased current collapse, and slight knee walkout, and this in turn leads to a reduced RF gain. This indicates that buffer improvements are likely necessary to improve GaN HEMT lifetime in high radiation environments.

Research Associate project: Dielectric and optical properties of CaCu₃Ti₄O₁₂ thin films containing

Ag nanoparticles, Supervisor: Prof. D. C. Agrawal, Indian Institute of Technology, Kanpur, India

One of the projects I was involved as research associate, is to characterize and optimize properties of CaCu₃Ti₄O₁₂ (CCTO), a capacitive memory device. The cubic perovskite CCTO have attracted ever-increasing attention due to very high dielectric constant $\epsilon_r \sim 10^4$, a promising material for miniaturization of the capacitors. The conducting metal particles dispersed in a dielectric matrix are known to increase the effective dielectric constant of the medium which is consistent with the percolation law. For this project we used sol-gel technique to incorporate silver particles in the CCTO thin films (spin coated) and observed an increase in the dielectric constant with increasing Ag concentration, which is attributed to the polarization at particle-dielectric interfaces. We have studied the effect of silver nanoparticles taking into account the different atmosphere and/or thermal conditions on the dielectric and optical properties of CCTO thin films.

M. Tech project: Solid Electrolytes/Superionic/fast ion conductors, Supervisor: Prof. K. Shahi, Indian

Institute of Technology, Kanpur, India

The developments in the area of ionic conductors have shown that the known solid state electrolytes have an excellent potential in a number of application domains. The major applications of solid electrolytes are in energy generation, fuel cells, and storage devices, sensing devices, electrochemical devices, photo-electrochemical devices and in biomimetic devices. I have done a project which involves synthesis and characterization of AgI-Ag₂O-V₂O₅ (SISOVO) amorphous superionic conductors. Primary

goal in this problem is to understand the superionic structure, and in particular the distribution of Ag, and demonstrate the mechanisms of amorphous phase formation and morphology changes of amorphous superionic conductors (a-SICs) during ball milling. We have investigated the differences between mechanical milled (MM) and melt quenched (MQ) glasses and established the unique properties of MM glasses. We have used these materials for batteries fabrication and characterizations.

CONFERENCES/ PRESENTATIONS

1. Linewidth Broadening of Coupled Quantum Dot Pairs, APS March Meeting, March 05-09, 2018; Los Angeles, CA; contributed paper, oral presentation, Presenter: **P. Kumar**
2. Charge Noise in InAs/GaAs Coupled Quantum Dot Devices, APS March Meeting, March 05-09, 2018; Los Angeles, CA; contributed paper, oral presentation, Presenter: Cameron Jennings
3. Stabilization of Cubic Crystalline Phase in Organo-metal Halide Perovskite Quantum Dots via Surface Energy Manipulation, APS March Meeting, March 05-09, 2018; Los Angeles, CA; contributed paper, oral presentation, Presenter: Som Sarang
4. Optophononic Polarization Rotation in Coupled Quantum Dots, APS March Meeting, March 05-09, 2018; Los Angeles, CA; contributed paper, oral presentation, Presenter: Andrew Jacobs
5. Linewidth Broadening of Coupled Quantum Dot Pairs, 2017 Annual Meeting of the Far West Section, November 3–4, 2017; Merced, California, contributed paper, oral presentation, Presenter: Parveen Kumar
6. Surface energy stabilization of cubic crystal phase in organic-inorganic Perovskite quantum dots at low temperatures, 2017 Annual Meeting of the Far West Section, November 3–4, 2017; Merced, California, contributed paper, oral presentation, Presenter: Som Sarang
7. Phonon-induced polarization rotation in coupled quantum dots, 2017 Annual Meeting of the Far West Section, November 3–4, 2017; Merced, California, contributed paper, oral presentation, Presenter: Andrew Jacobs
8. Charge noise in InAs/GaAs coupled quantum dot devices, 2017 Annual Meeting of the Far West Section, November 3–4, 2017; Merced, California, contributed paper, poster presentation, Presenter: Cameron Jennings
9. Spectral broadening of optical transitions in InAs/GaAs coupled quantum dot pairs, P. Kumar, C. Czarnocki, C. Jennings, J. Casara, A. Monteros, N. Zahbihi, A. S. Bracker, B. C. Pursley, D. Gammon, S. E. Economou, S. G. Carter and M. Scheibner, APS March Meeting, March 13-17, 2017; New Orleans, LA; contributed paper, oral presentation, Presenter: **P. Kumar**
10. Proton irradiation-induced traps causing VT instabilities and RF degradation in GaN HEMTs Anup Sasikumar, Z. Zhang, **P. Kumar**, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, P. Saunier, C. Lee, S. A. Ringel, and A. R. Arehart, presented at IEEE Intl. Reliab. Phys. Symp. Monterey, CA (April 19-23, 2015). Presenter: Anup Sasikumar
11. Comparison of Irradiation and Electrical Stressors on AlGaIn/GaN HEMT Reliability Anup Sasikumar, Z. Zhang, **P. Kumar**, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, P. Saunier, C. Lee, S. A. Ringel, and A. R. Arehart, presented at the Government Microcircuit Applications and Critical Technology Conference, St. Louis, MO (March 23-26, 2015). Presenter: A. R. Arehart
12. Tuning Band Energies in a Combined Axial and Radial GaAs/GaP Heterostructure, L. M. Smith, Y. Wang, **P. Kumar**, H. E. Jackson, J. M. Yarrison-Rice, C. Pryor, J. H. Kang, Q. Gao, H. Hoe Tan, C. Jagadish, MRS Fall Meeting, December 1-6, 2013; Boston, MA; contributed paper, oral presentation, Presenter: H. E. Jackson
13. Photocurrent spectroscopy of GaAs/GaP hetero-structured nanowires, **P. Kumar**, H.E. Jackson, L. M. Smith, J. Yarrison Rice, J. H. Kang, Q. Gao, H.H. Tan and C. Jagadish, APS March Meeting, March 18-22, 2013; Baltimore, MD; contributed paper, *oral presentation*, Presenter: **P. Kumar**
14. Modeling of Au Nanoparticles and Semiconductor Nanowires for Nanodevice Applications, A. Makepeace, J.M. Yarrison-Rice, **P. Kumar**, L.M. Smith, H.E. Jackson, Y.J. Choi, J.G. Park, C. Jagadish, APS March Meeting, March 18-22, 2013; Baltimore, MD; contributed paper, *oral presentation*, Presenter: A. Makepeace
15. Nanophotonic Finite Difference Time Domain Simulations for Plasmon Enhanced Chemical Sensors, **P. Kumar**, H.E. Jackson, L. M. Smith, J. Yarrison Rice, Young-Jin Choi, Jae-Gwan Park, APS Ohio-Region Meeting, Oct 05-6, 2012; Detroit, MI; contributed paper, *oral presentation*, Presenter: A. Makepeace
16. Nonlinear Two-Photon Photocurrent Spectroscopy of CdS Nanosheets and Nanowires, **P. Kumar**, A. Wade, H.E. Jackson, L. M. Smith, J. Yarrison Rice, Young-Jin Choi, Jae-Gwan Park, MRS Spring

- Meeting, April 09-13, 2012; San Francisco CA; contributed paper, *oral presentation*, Presenter: **P. Kumar**
17. Photocurrent spectroscopy of CdS nanosheets, **P. Kumar**, A. Wade, H.E. Jackson, L. M. Smith, J. Yarrison Rice, Young-Jin Choi, Jae-Gwan Park, APS March Meeting, March 21-25, 2011; Dallas, TX; contributed paper, *oral presentation*, Presenter: **P. Kumar**
 18. Two-photon induced photocurrent imaging in CdS Nanosheets, **P. Kumar**, A. Wade, H.E. Jackson, L. M. Smith, J. Yarrison Rice, Young-Jin Choi, Jae-Gwan Park, APS March Meeting, March 15–19, 2010; Portland, OR; contributed paper, *oral presentation*, Presenter: **P. Kumar**
 19. Spatially-Resolved Photoluminescence and Photocurrent Spectroscopy of CdS Nanosheet Devices, A. Wade, **P. Kumar**, H.E. Jackson, L.M. Smith, J.M. Yarrison-Rice, Y.J. Choi, J.G. Park, APS March Meeting, March 15–19, 2010; Portland, OR; contributed paper, *oral presentation*, Presenter: A. Wade
 20. Quantum Phenomena in Semiconductor Nanowire Heterostructures, Leigh M. Smith, S. Perera, M.A. Fickenscher, A. Wade, K. Pemasiri, M. Montazeri, **P. Kumar**, H.J. Joyce, M. Gao, H.H. Tan, C. Jagadish, MRS Fall Meeting, November 30 - December 4, 2009; Boston, MA; *invited talk*, Presenter: Leigh M. Smith
 21. Scanning photocurrent imaging in CdS nanosheets, **P.Kumar**, A. Maharjan, M. Fickenscher, H. E. Jackson, L. Smith, A. Kogan, APS March meeting, March 16–20, 2009; Pittsburgh, PA; contributed paper, *oral presentation*, Presenter: **P. Kumar**
 22. Photocurrent imaging in CdS nanosheets, **P.Kumar**, A. Maharjan, H.E. Jackson, L.M. Smith, A. Kogan, Ohio Innovation Summit, April 20-23, 2009 Dayton, OH; *poster presentation*, Presenter: **P. Kumar**
 23. Photocurrent and Transport spectroscopy of single InP nanowires, A.Maharjan, **P.Kumar**, H.E.Jackson, L.Smith, A.Kogan, Ohio Innovation Summit, April 20-23, 2009 Dayton, OH; *poster presentation*, Presenter: A.Maharjan
 24. Effect of calcium variation on dielectric response of the sol-gel derived $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ thin films, Deepam Maurya, **Parveen Kumar**, Devendra P. Singh and D.C. Agrawal, XIVth National Seminar on Ferroelectrics and Dielectrics, December 18-21, 2006, IIT Kharagpur India; *poster presentation*, Presenter: Deepam Maurya
 25. Dielectric and optical properties of $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ films containing Ag nanoparticles, **Parveen Kumar**, Devendra P Singh, D C Agrawal and Y N Mohapatra, International conference on nano-materials for electronics, November 27-29, 2006, Centre for Materials for Electronics Technology (C-MET)", and Department of Information Technology, Pune India, *poster presentation*, Presenter: Devendra P Singh
 26. Synthesis and characterization of AgI- $\text{Ag}_2\text{O-M}_x\text{O}_y$ (M=V, B) Amorphous Superionic Systems, **Parveen Kumar** and K. Shahi, National Conference on Condensed Matter and Materials Physics "CMMP06" 19-21st January 2006, The M.S.University of Baroda, Vadodara, *oral presentation*, Presenter: **Parveen Kumar**
 27. Morphological and Electrical Study of Mechanochemically Synthesized AgI- $\text{Ag}_2\text{O-V}_2\text{O}_5$ Amorphous Superionic Systems" **Parveen Kumar** and K. Shahi, the proceedings of National Symposium on "Current Trends in Materials Characterization" December 5-7, 2005, IIT Kanpur, India, *poster presentation*, Presenter: **Parveen Kumar**
 28. Ion transport and electrical study of Mechanochemically Synthesized AgI- $\text{Ag}_2\text{O-V}_2\text{O}_5$ Amorphous Superionic Systems", **Parveen Kumar** and K.Shahi, The National Conference: "Physics 2005, 100 YEARS AFTER EINSTEIN'S REVOLUTION a National Conference to celebrate the World Year of Physics 2005", November 3-6, 2005 IIT, Kanpur India, *oral presentation*, Presenter: **Parveen Kumar**

Intra-University Conferences/Presentations:

1. Two-Photon induced Photocurrent Spectroscopy of CdS Nanosheets, P. Kumar, A. Wade, H.E. Jackson, L. M. Smith, J. Yarrison Rice, Young-Jin Choi, Jae-Gwan Park, Graduate poster Forum, University of Cincinnati, OH; March 02, 2012, poster presentation, Presenter: P. Kumar
2. Two-Photon induced Photocurrent Spectroscopy of CdS Nanosheets, Physics student poster competition, University of Cincinnati, OH; February 15, 2012, *poster presentation*, Presenter: **P. Kumar**
3. Photocurrent spectroscopy of CdS nanosheets, **P. Kumar**, A. Wade, H.E. Jackson, L. M. Smith, J. Yarrison Rice, Young-Jin Choi, Jae-Gwan Park, Graduate poster Forum, University of Cincinnati, OH; February 25, 2011, *poster presentation* (Best Poster Award in Engineering & Physical Sciences), Presenter: **P. Kumar**
4. Photocurrent spectroscopy of CdS nanosheets, **P. Kumar**, A. Wade, H.E. Jackson, L. M. Smith, J. Yarrison Rice, Young-Jin Choi, Jae-Gwan Park, Physics student poster competition, University of Cincinnati, OH; February 18, 2011, *poster presentation*, Presenter: **P. Kumar**

5. Two-photon induced photocurrent imaging in CdS Nanosheets, **P. Kumar**, A. Wade, H.E. Jackson, L. M. Smith, J. Yarrison Rice, Young-Jin Choi, Jae-Gwan Park, Graduate poster Forum, University of Cincinnati, OH; *March 05, 2010 poster presentation*, Presenter: **P. Kumar**
6. Two-photon induced photocurrent imaging in CdS Nanosheets, **P. Kumar**, A. Wade, H.E. Jackson, L. M. Smith, J. Yarrison Rice, Young-Jin Choi, Jae-Gwan Park, **Special Colloquium**, University of Cincinnati, OH; February 06, 2010; *oral presentation*, Presenter: **P. Kumar**
7. Two-photon induced photocurrent imaging in CdS Nanosheets, **P. Kumar**, A. Wade, H.E. Jackson, L. M. Smith, J. Yarrison Rice, Young-Jin Choi, Jae-Gwan Park, Physics student poster competition, University of Cincinnati, OH; February 05, 2010; *poster presentation, 2nd prize winner*, Presenter: **P. Kumar**
8. Scanning photocurrent imaging in CdS nanosheets, **P.Kumar**, A.Maharjan, M.Fickenscher, H.E. Jackson, L.Smith, A.Kogan, Graduate poster Forum, University of Cincinnati, OH; *March 06, 2009, poster presentation*, Presenter: **P. Kumar**
9. Photocurrent and Transport spectroscopy of single InP nanowires, A.Maharjan , **P.Kumar**, H.E.Jackson, L.Smith, A.Kogan, Graduate poster Forum, University of Cincinnati, OH; *March 06, 2009, poster presentation*, Presenter: A.Maharjan
10. Scanning photocurrent imaging in CdS nanosheets, **P. Kumar**, A. Maharjan, M. Fickenscher, H.E. Jackson, L. Smith, A. Kogan, Physics student poster competition, University of Cincinnati, OH; February 11, 2009, *poster presentation*, Presenter: **P. Kumar**
11. Synthesis and Characterization of Silver based Amorphous Superionic Conductors (a-SICs), **Parveen Kumar** and K. Shahi, Material Science Programme, Department Seminar, IIT Kanpur, India, 2005, *oral presentation*, Presenter: **Parveen Kumar**
12. Amorphous Glasses, **Parveen Kumar** and K. Shahi, Material Science Programme, Department Seminar, IIT Kanpur, India, 2004, *oral presentation*, Presenter: **Parveen Kumar**

Invited Talks

1. Optoelectronic Investigation of Single CdS Nanosheets and Single GaP/GaAs Nanowire Heterostructures, Physics Department Seminar, University of California, Merced, CA; September 16, 2016
2. Optoelectronic Investigation of Single CdS Nanosheets, AiMM seminar series, University of California, Merced, CA; August 10, 2016
3. Two-photon induced photocurrent imaging in CdS Nanosheets, Physics Departmental Colloquium, State University of New York, Oswego, NY; February 26, 2016
4. Photocurrent Spectroscopy, Physics Departmental Seminar, North Kentucky University, Highland Heights, KY; January 27, 2016
5. Optoelectronic Investigation of Single CdS Nanosheets and Single GaP/GaAs Nanowire Heterostructures, ECE Departmental Seminar, The Ohio State University, Columbus , OH; May 28, 2013
6. Scanning photocurrent imaging in CdS nanosheets, The Ohio State University, Columbus , OH; April 29, 2013

LIST OF REFERENCES

(Letters of recommendation will be emailed directly to you upon request)

List of references:

(Letters of recommendation will be emailed directly to you upon request)

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