DR. NILESH KUMAR PATHAK
Ph. : +91-9953401294 ; Email: nileshpiitd@gmail.com

PROFILE

Energetic, Hardworking and confident, have the ability to do things within agreed deadlines and with meticulous attentions to details. I am cool headed and have a positive aura. Have been a proactive leader, do work assigned with dedication and believes in team work.

Educational Details

Research Profile:

Research Gate: **https://www.researchgate.net/profile/Nilesh-Pathak/research**

Google Scholar:

https://scholar.google.com/citations?hl=en&user=apB68nYAAAAJ&view_op=list_works&alert_preview_top_rm=2&sortby=pubdate

Citations	286
h-index	10
i10-index	11

- **July 2018 to Present: I am working as an Assistant Professor Department of Physics, Maharaja Agrasen College, University of Delhi, Delhi-110096, INDIA**

- **2016- 2018 National Postdoc fellow (NPDF), SERB/University of Delhi**

  Project Title: Plasmonic properties of realistic shape nanostructures and its application to thin film of perovskite.

  Mentor: **Dr. P Senthil Kumar**, Assistant Professor, Department of Physics & Astrophysics, University of Delhi

  Summary of Project: The main objective of the proposal was to simulate variety of realistic shape metal nanostructure and their interaction to the substrate for thin film application.

  Project cost Rs: 1920000

  Project Duration: 2yrs

  Funding Agency: SERB India

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2011-2016 **Ph. D (PHYSICS)**

Thesis Title: Study of Plasmonic properties of metal nanoparticles and its application

Institute/University: **Indian Institute of Technology Delhi, India**

Thesis Supervisor: **Prof. R. P. Sharma**

Cumulative Grade Point (Pre-Ph.D. Courses): **8.5/10**.

Brief summary of Ph.D work

The fundamental plasmonic properties of metal nanoparticles and their interaction to various organic/inorganic surrounding media have been studied in terms of surface plasmon resonances during the Ph.D. tenure. The main focus of the work was to study and tune the surface plasmon resonances (SPRs) in different regime of electromagnetic spectrum which covers broad range of application. To simulate the plasmonic properties of metal nanogeometries, the following semi-analytical and numerical approaches were used

1. **Semi-analytical Approach**
(a) Electrostatic Approach: Dipole model
(b) Electrodynamic Approach: Mie scattering theory

2. Numerical Approach
(a) DDA: Discrete Dipole Approximation
(b) COMSOL Multiphysics
(c) FDTD: Finite Difference time domain

2007-2009 **Master of Science (Physics)**

Institute/University: Veer Bahadur Singh Purvanchal University, U.P., India

Marks obtained: 760/1200 **(63.33 %)**

2005-2006 **Post Graduate Diploma in Computer Application**

Institute/University: U.P. College Varanasi, U.P., India

Marks obtained: 669/1000 **(66.9%)**

2002-2005 **Bachelor of Science**

Institute/University: K.P.G. College Jaunpur, Veer Bahadur Singh Purvanchal University U.P., India

Marks obtained: 972/1800 **(54%)**

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Scholastic Achievement

Fellowships/Examinations qualified:

- Awarded by Science & Engineering Research Board (SERB) **National Postdoctoral fellowship** by **Department of Science & Technology** by Government of India in 2016.
- Awarded by **EPFL Swiss exchange fellowship** by Switzerland Government in 2014.
- Awarded by **MNRE** (Ministry of New Renewable Energy) Fellowship by Government of India in July 2012.
- Qualified **GATE** (Graduate Aptitude Test in Engineering)-2011-12: organized by IIT.
- Qualified Entrance Exam for B.Sc. Organized by K. P.G. College. Jaunpur U.P. India.
- Qualified Entrance Exam for M.Sc. with **first rank** Organized by Purvanchal University (T.D. P.G. College) Jaunpur U.P. India.

Publications

- **International Research Publications :27**
- **Conference paper Proceedings : 4**
- **Books Chapters: 4**
- **Online Webinar: 10**
- **Invited talk : 4**
- **Presentation in conference: 10**

MEMBERs

1. ACS member
2. RSC member

Journals Reviewer:

- Nanoscale, Publisher:RSC
- Nature Scientific Report
- Applied Nano Materials, Publisher: ACS
- Photonics, Publisher: ACS
- Plasmonics, Publisher: Springer

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- Journal of Physics D: Appl. Phys., Publisher: IOP
- Physical chemistry Chemical Physics (PCCP), Publisher:RSC
- Karbala International Journal of Modern Science, Publisher: Elsevier
- Elsevier book production
- Journal of Electromagnetic Waves and Applications
- Nano Express (IOP)

Member Editorial Board:

- Frontiers of Mechatronical Engineering

Teaching Assignments

- Course Taught: **Mechanics**, BSc Physical science First year Students SEM- I from 2018- 2021
- Course Taught: **Electricity, Magnetism & EMT**, BSc Physical science First year Students SEM- II from 2018- 2021
- Course Taught: **Renewable energy and Energy Harvesting, Skill Enhancement Course**, BSc Physical science Second year Students SEM- IV from 2018- 2021
- Course Taught: **Mathematical Physics**, BSc Physical Science Third year Students SEM- VI from 2018- 2021
- Associated with taking practical classes (Wave and Optics Lab) for MSc students in University of Delhi, 2016-2018
- Associated with teaching, Taught Non Linear Dynamics courses (Phase space trajectory part) to the B.Tech students in IIT Delhi from 2012-2016.
- **My YouTube Lectures Link** I have prepared a YouTube lecture in the COVID-19 pandemic situation to help the BSc Physical Science UG Students. Links are given below
- 1. https://www.youtube.com/watch?v=09quKHGNxt4&t=29s
- 2. https://www.youtube.com/watch?v=A0x3q5vG_7c&t=39s
- 3. https://www.youtube.com/watch?v=wHNv_Tfdrbw&t=133s

Technical Skills

- Programming languages **FORTRAN**
- Operating Systems **Windows**
- Software tools **MATLAB,**

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MATHEMATICA,

COMSOL Multiphysics

FDTD [Finite Difference Time Domain (Fundamental level)]**,**

DDA [**Discrete Dipole Approximation Method** (FORTRAN based)]

Extra-Curricular Activities

- **Ph.D. Representative** of Energy Forum in Centre for Energy Studies IIT Delhi (INDIA) 2012-2014
- **Volunteer** in Open House of IIT Delhi 2012-2016
- **Participant** in Open House of IIT Delhi 2012-2016
- Worked as a social worker under NSS scheme 2012-2016
- Worked as Committee member in Annual activity College Committee from 2018-2020.
- Working as Committee member in College Discipline Committee from 2020 to till now.
- Working as Committee member in College NSS Committee from 2020 to till now.

International Research Publications:

1. **Nilesh Kumar Pathak**, Parthasarathi, Study of thermoplasmonic properties of gold nanodimer in visible-infrared region of electromagnetic spectrum, Nano Express 2 (2021) 040007.
2. **Nilesh Kumar Pathak**, Parthasarathi, Study of thermoplasmonics of gold metal nanoshell at their surface plasmon resonance. *Design Engineering*, 8, (2021), 1142-1152.
3. **Nilesh Kumar Pathak**, Parthasarathi and Gyanendra Krishna Pandey, Comparative study of thermoplasmonic effects of gold and silver metal nanoparticle, **AIP Advances 11**, 045323 (2021).
4. Parthasarathi, **Nilesh Kumar Pathak**, Application of exact solution of complex morse potential to investigate physical systems with complex and negative masses, ***J. Phys. Commun.*** **5** 065006, 2021.
5. Boazbou Newmai, **Nilesh Kumar Pathak**, P Senthil Kumar, Molecular aspects of oligomer-coupled ultra-small Au nanoparticles, J. of Phys. and Chem. of Solids, 2020, DOI: 10.1016/j.jpcs.2020.109378 ISSN: 0022-3697 IF=3.442

6. **Nilesh Kumar Pathak**, Plasmonic nanostructures for energy application, Frontiers in Mechanical Engineering 6, 53, 2020.
7. **Nilesh Kumar Pathak**, Parthasarathi, P Senthil Kumar, R. P. Sharma, Tuning of the surface plasmon resonance of aluminum nanoshell near-infrared regimes, *Physical Chemistry Chemical Physics*, 2019, **21**, 9441 – 9449. DOI: 10.1039/c9cp01115c IF 3.43, **ISSN** 1463-9076
8. **Nilesh Kumar Pathak**, P Senthil Kumar, R. P. Sharma, Study of Optical Cross Section of Anisotropic Core–Shell Nanostructure Inside a Perovskite Environment: the Influence of Gain Media, Plasmonics, 2019, Vol. 14 Issue 1, p63-70. 8p, DOI: 10.1007/s11468-018-0778-3.
9. **Nilesh Kumar Pathak**, Alok Ji, R. P. Sharma, Study of efficiency enhancement in layered geometry of excitonic-plasmonic solar cell, **Appl. Phys. A**, (2014) 115:1445–1450, IF 1.455, ISSN 0947-8396, SI. No. 3
10. **Nilesh Kumar Pathak** & Alok Ji & R. P. Sharma, Tunable Properties of Surface Plasmon Resonances: The Influence of Core–Shell Thickness and Dielectric Environment, **Plasmonics** (2014) 9:651–657, IF 2.139, ISSN 1557-1955, SI No. 1.. 1.
11. **Nilesh Kumar Pathak**, Gyanendra Krishna Pandey, Alok Ji, R. P. Sharma, Study of Light Extinction and Surface Plasmon Resonances of Metal Nanocluster: a Comparison Between Coated and Non-coated Nanogeometry, **Plasmonics** (2015) 10:1597–1606.
12. **Nilesh Kumar Pathak**, R. P. Sharma, Study of Broadband Tunable Properties of Surface Plasmon Resonances of Noble Metal Nanoparticles Using Mie Scattering Theory: Plasmonic Perovskite Interaction, **Plasmonics** (2016) 11:713–719.
13. **Nilesh Kumar Pathak**, Nikhil Chander, Vamsi K. Komarala, R. P. Sharma, Plasmonic Perovskite Solar Cells Utilizing Au@SiO2 Core-Shell Nanoparticles, **Plasmonics** (2017) 12:237–244
14. **Nilesh Kumar Pathak**, Hardik Pathak, Gyanendra Krishna Pandey, Alok Ji, R. P. Sharma, Study of external quantum efficiency of plasmonic coupled bilayer active device: influence of layer thickness and nanoparticle filling factor, **Appl. Phys. A** (2016) 122:1048.
15. Alok Ji, R. P. Sharma, Anju Kumari, **Nilesh Kumar Pathak**, Numerical Simulation of Solar Cell Plasmonics for Small and Large Metal Nano Clusters Using Discrete Dipole Approximation, **Plasmonics** (2014) 9:291–297. 2.139
16. Alok Ji, Richa Sharma, Hardik Pathak, **Nilesh Kumar Pathak**, R P Sharma, Numerical simulation of plasmonic light trapping in thin-film Si solar cells: surface coverage effect, **J. Phys. D: Appl. Phys.** (2015) 48 275101 (7pp). ISSN: 00223727, IF 2.588, SI No. 1
17. Richa Sharma, Sangita Roopak, **Nilesh Kumar Pathak**, R. Uma, R. P. Sharma, Numerical Simulation of Electromagnetic Wave Interaction with Spheroidal Core-Shell Nanoparticle: Dependence of Surface Plasmon Resonance on Core-Shell Composition**,** ***Plasmonics*** **volume 13, pages335–343(2018)** , DOI 10.1007/s11468-017-0518-0. Published: 19 January 2017

18. Hardik Pathak, **Nilesh Kumar Pathak**, Alok Ji, Sangita Roopak, Gyanendra Krishna Pandey, and R. P. Sharma, Broadband Scattering With Strong Electric Field Coupling Between Metal Nanostructures Using DDA Simulation: Role of Different Organic Environments, **IEEE Journal of Photovoltaics**, (2016), 6:940-951. ISSN: 21563381, IF: 3.712, SI. No. 1
19. Hardik Pathak, Alok Ji, **Nilesh Kumar Pathak**, R. P. Sharma, Numerical simulation of metal subwavelength nanogeometries in organic media using DDA technique: a coupled broadband resonant near electric field perspective, **J. Opt.** (2017) 46(2):132–142. ISSN: 0972-8821.
20. Hardik Pathak, Alok Ji, **Nilesh Kumar Pathak**, R. P. Sharma, Resonant Broadband Field Enhancement in Cylindrical Plasmonic Structure Surrounded by Perovskite Environment, **Plasmonics** (2017) 12(5):1511-1522. DOI 10.1007/s11468-016-0413-0.
21. Sangita Roopak, **Nilesh Kumar Pathak**, Alok Ji, R. P. Sharma, Numerical Simulation of Broadband Scattering by Coated and Noncoated Metal Nanostructures Using Discrete Dipole Approximation Method, **Plasmonics** (2016) 11:425–432.
22. Sangita Roopak, **Nilesh Kumar Pathak**, Richa Sharma, Alok Ji, Hardik Pathak, R. P. Sharma, Numerical Simulation of Extinction Spectra of Plasmonically Coupled Nanospheres Using Discrete Dipole Approximation: Influence of Compositional Asymmetry, **Plasmonics** (2016) 11:1603–1612.
23. Gyanendra Krishna Pandey, **Nilesh Kumar Pathak**, Alok Ji, Hardik Pathak, R. P. Sharma, Study of Surface Enhanced Raman Scattering of Single Molecule Adsorbed on the Surface of Metal Nanogeometries: Electrostatic Approach, **Plasmonics** (2016) 11:1343–1349.
24. Gyanendra Krishna Pandey, **Nilesh Kumar Pathak**, R. Uma, R. P. Sharma Study of Surface-Enhanced Raman Scattering of Plasmonic Coupled Biomolecule: Role of Multi-Layered Nanosphere Plasmonics (2017) DOI 10.1007/s11468-017-0502, Published: 19 January 2017, **13**, pages221–229
25. Gyanendra Krishna Pandey, **Nilesh Kumar Pathak**, R. Uma, R. P. Sharma Electromagnetic study of surface enhanced Raman scattering of plasmonic biomolecule: An interaction between nanodimer and single biomolecule. **Solid State Communications** (2017) 255–256 47–53, ISSN 00381098, IF: 1.544, SI No. 1
26. S. Bhardwaj, **Nilesh Kumar Pathak**, Alok Ji, R. Uma, R. P. Sharma Tunable Properties of Surface Plasmon Resonance of Metal Nanospheroid: Graphene Plasmon Interaction **Plasmonics** (2017) 12:193–201. Published online: 24 May 2016
27. Richa Sharma, **Nilesh Kumar Pathak**, R. P. Sharma, Computational Study of Plasmon Interaction in Organic Media: Comparison Between Analytical and Numerical Model for Dimer, **Plasmonics (2018) 13:1775–1784**, doi.org/10.1007/s11468-018-0691-9 Published: 29 January 2018

Conference papers:

1. **Nilesh Kumar Pathak** and R. P. Sharma, Study of surface plasmon resonance of core-shell nanogeometry under the influence of perovskite dielectric environment: Electrostatic approximation, 2015, AIP Proceeding, SSPS, Amity University Noida, UP, India

2. **Nilesh Kumar Pathak**, Gyanendra Krishna Pandey, Hardik Pathak and R. P. Sharma, Optical Properties of Noble Metal Nanoparticles and its Application to Thin Film Photovoltaics 2016, EESC Proceeding. Conference on Electrical Energy: Safety & Conservation.
3. **Nilesh Kumar Pathak**, P. Senthil Kumar, R. P. Sharma, plasmonic properties of metal alloy nanoparticles and its applications 2017 Proceedings of SARC International Conference, 16th July, 2017, Chandigarh, India ISSN: 2449913X
4. **Nilesh Kumar Pathak**, P. Senthil Kumar, R. P. Sharma, Nanoplasmonic Effects and its Interaction to Perovskite Environment, ICTF-17 Proceedings, 13-17 November 2017, NPL Delhi, India.

Book chapters:

1. Book: Handbook of Research on Food Processing and Preservation Technologies, eBook ISBN9781003184720, DOIhttps://doi.org/10.1201/9781003184720,
   Chapter Title: Fourier Transform Infrared (FTIR) Spectroscopy with Chemometrics: Evaluation of Food Quality and Safety, Neelam Upadhyay, C. G. Harshitha, **Nilesh Kumar Pathak**, Rajan Sharma, **Publisher** Taylor & Francis Group, 2021
2. Book Title **Trends in Materials Research,** ISBN: 978-93-5234-055-2

   Chapter Title: Thermoplasmonic Properties of Noble Metal-Nanoparticles and its Applications, Nilesh Kumar Pathak, Parthasarathi and Gyanendra Krishna Pandey, Publisher: Ayushman publication house New Delhi (India), 2021
3. **Book Title**: Noble metal-metal oxide hybrid nanoparticles: fundamentals and applications

   Chapter Title: Plasmonic Perovskite Solar Cells Utilizing Noble metal – Metal Oxide Hybrid Nanoparticles, Publisher: Elsevier, 2019.

   Publisher: Elsevier, Editor: Nguyen Tuan Anh, Phuong Nguyen Tri, Satyabrata Mohapatra, ISBN: 978-0-12-814134-2 (Hardcover); 978-0-12-814135-9 (eBook)
4. **Book Title**: Emerging Solar Energy Materials, ISBN 978-953-51-6000-7.

   Chapter Title: Plasmonic Resonances and its Application to Solar Cell **Publisher**: InTech Open, 2017.
5. **Book Title**: Plasmonics, ISBN 978-953-51-6337-4.

   Chapter Title: A perspective on plasmonics within and beyond the electrostatic approximation,

   Publisher: InTech, 2018

Workshops/ Conferences Attended (Poster Presented):

1. **National convention** on national renewable energy, MNRE India, 6-7 November 2013.
2. **International conference** on Recent advances in bio-energy Research (ICRABR-2015) Sardar Swaran Singh National institute of Renewable Energy Kapurthala Punjab India, 14-17 March 2015.

3. **International workshop** on Research on the possible impact of EMF Radiation from mobile tower and headsets**,** Bharti School IIT Delhi, 8-9 April 2016.
4. **Workshop** on Optics and Photonics: Theory and Computational techniques (OPTCT), IIT Delhi India, 4-5 March 2107.
5. **NANO India 2017**, IIT Delhi India, 15-17 March 2017.
6. **XIX International Workshop** on The Physics of Semiconductor Devices (IWPSD) Jointly Organized by Solid State Physics Laboratory, Delhi Defence Research & Development Organization and Indian Institute of Technology Delhi, India 12-15 December, 2017.
7. **One Week Short Term Course** on "Nanomaterials for advanced applications" NAA, 9-13 March 2018, School of Material Science and Technology (SMST), National Institute of Technology Kurukshetra, Haryana, India.
8. **Virtual School**

   Virtual 2021 OMN Summer School on Reconfigurable Photonic Computing, Limits of Metastructures, Future Directions in Nanophotonic and Biophotonic Sensors, from August 3-5, 2021

References

- **Prof. R. P. Sharma (Thesis Supervisor),** Centre for Energy Studies, Indian Institute of Technology Delhi, Delhi, Hauz Khas, 110016, India
  Email i.d.: rpsharma@ces.iitd.ernet.in

- **Prof. R. P. Tandon (Thesis reviewer internal),** Room No-116, Department of Physics and Astrophysics University of Delhi, Delhi-110007, India
  Phone: +91-11-27667725 Ext: 1367
  Mobile no.: +91 981022 9608
  Email i.d.: rptandon9@physics.du.ac.in, ram_tandon@hotmail.com

- **Prof. Eli Kapon (Professor) (During Exchange Student Program),** Laboratory of the Physics of Nanostructures EPFL SB ICMP LPN PH D3 424 (Bâtiment PH), Station 3 CH-1015 Lausanne Switzerland
  Phone: +41 (0)21 69 33388
  Mobile no.: +91 981022 9608
  Email i.d.: Eli.Kapon@epfl.ch

- **Dr. P Senthil Kumar**, **Associate Professor (Post Doc Mentor)**, Department of Physics & Astrophysics University of Delhi, Delhi 110007 India

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Mobile no.: +91-9717623716
Email i.d. : pskumar@physics.du.ac.in

- **Dr. Vamsi K Komarala, Professor,** Centre for Energy Studies Indian Institute of Technology Delhi, Delhi, Hauz Khas, 110016, **India**
  Email i.d.: vamsi@ces.iitd.ac.in

- **Dr. R Uma**, **Associate Professor,** Centre for Energy Studies, Indian Institute of Technology Delhi, Delhi, Hauz Khas, 110016, India
  Email i.d.: ruma@ces.iitd.ernet.in

Personal Details

- Date of birth : Oct 20nd, 1985.
- Language known : English, Hindi.
- Nationality : Indian
- Father's name : Late Sh. Radheshyam Pathak (Head Master)
- Mother's name : Late Smt Pushpa Devi (Home Maker)
- Marital status : Married
- Permanent Address :Village & Post Hiramanpur, Tahsil Pindra, Distt **Varanasi**, (U.P.) PIN-221208

DATE: 16th Nov, 2022

(Nilesh Kumar Pathak)