

DR. NILESH KUMAR PATHAK

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(2) nkpathak@mac.du.ac.in

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_Pathak3

Google Scholar: <https://scholar.google.com/citations?hl=en&user=apB68nYAAAAJ>

➤ **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.

➤ **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

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- (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

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.

Journals Reviewer: More than 10 Journals

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

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- Plasmonics, Publisher: Springer
- 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

Member Editorial Board:

- Frontiers of Mechatronical Engineering

Technical Skills

- Programming languages **FORTRAN**
- Operating Systems **Windows**
- Software tools **MATLAB,**
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)
- **Volunteer** in Open House of IIT Delhi (INDIA)
- **Participant** in Open House of IIT Delhi (INDIA)
- Worked as a social worker under NSS scheme (INDIA)

Publications

- International Research Publications **22**
- Conference paper **4**
- Books Chapters **4**

Online Webinar 10

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International Research Publications:

1. **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
2. **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
3. **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* 2018, DOI: 10.1007/s11468-018-0778-3.
4. **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
5. **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.
6. **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.
7. **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.
8. **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
9. **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.
10. **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

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11. 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
12. 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](#)
13. 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
14. 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.
15. 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.
16. 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.
17. 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.
18. 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.
19. 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
20. 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
21. 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

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22. 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 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)
2. **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.
3. **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.

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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.

Teaching Assignments

- Associated with teaching, Taught Non Linear Dynamics courses to the B.Tech students in IIT Delhi
- Associated with taking practical classes (Wave and Optics Lab) for MSc students in University of Delhi.

References

- **Prof. R. P. Sharma (Thesis Supervisor)**, Centre for Energy Studies, Indian Institute of Technology Delhi, Delhi, Hauz Khas, 110016, India
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- **Prof. R. P. Tandon (Thesis reviewer internal)**, Room No-116, Department of Physics and Astrophysics University of Delhi, Delhi-110007, India
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- **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
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- **Dr. Vamsi K Komarala, Associate Professor**, Centre for Energy Studies Indian Institute of Technology Delhi, Delhi, Hauz Khas, 110016, India

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- **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 Hiranpur, Tahsil Pindra, Distt Varanasi, (U.P.)
PIN-221208

DATE: 27th Nov, 2020

(Nilesh Kumar Pathak)