

## NEERAJ KUMAR

### Contact Information:

Department of Inorganic and Physical Chemistry (IPC)

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<https://scholar.google.co.in/citations?user=qR1MTkAAAAAJ&hl=en>



### Area of Research Interest:

Electrochemistry of organic compounds, Voltammetric based electrochemical and biosensors

Synthesis of polymer-nanocomposite, composites of metal nanoparticles by using electrochemical or chemical methods

Synthesis and functionalization of nanoparticles such as carbon nanotubes, graphene, gold nanoparticles, silver nanoparticles, iron-oxide nanoparticles, functionalized of graphene oxide

### Education:

**Ph. D.:** Indian Institute of Technology, Roorkee, Roorkee, India

**Dec. 2014 to Aug. 2019**

Department of Chemistry, Supervisor: Dr. R.N. Goyal and Dr. M.R. Maurya

**Thesis Title- “Voltammetric sensors for highly sensitive determination of biomolecules and drugs”**

**M.Sc:** Gurukula Kangri Vishwavidyalaya, Haridwar, India with 71.95%

**2012 to 2014**

**B.Sc:** Gurukula Kangri Vishwavidyalaya, Haridwar, India with 71.52%

**2009 to 2012**

### Experience:

**Teaching Assistantship**

Department of Chemistry, Indian Institute of Technology Roorkee, India

**Aug. 2016 to June 2018**

**Research Associate :** CSIR - Central Building of Research Institute, India

**Feb. 2020 to Sep. 2020**

**SERB National Postdoctoral Fellow (N-PDF):** Indian Institute of Science Bangalore, India

**Jan. 2021 to present**

### Honors and Fellowship:

National Postdoctoral Fellowship, Science & Engineering Research Board (SERB), DST, India

**Jan. 2021 to present**

Junior Research Fellowship, Ministry of Human Research and Development, India

**Dec. 2014 to Dec. 2016**

Senior Research Fellowship, Ministry of Human Research and Development, India

**Dec. 2016 to Aug. 2019**

Graduate Aptitude Test in Engineering (GATE-2016) and (GATE-2019)

**2016, 2019**

Council of Scientific and Industrial Research -Human Resource Development Group CSIR-HRDG,

**2014 (June)**

CSIR-NET All India Rank 053/792, 059/682

**2015 (June)**

2<sup>nd</sup> prize in poster presentation in National, Seminar on Recent Trends in Nanobiosensors

**2018 (Feb)**

Organized by University of Madras, Guindy Campus, Chennai

### Peer Reviewed Publications:

1. **Neeraj Kumar**, Rosy, Rajendra N. Goyal, “Gold-palladium nanoparticles aided electrochemically reduced graphene oxide sensor for the simultaneous estimation of lomefloxacin and amoxicillin”, **Sensors and Actuators B: Chemical** 243 (2017) 658–668 (CIF: 7.46).
2. **Neeraj Kumar**, Rosy, Rajendra N. Goyal, “Nanopalladium grained polymer nanocomposite based sensor for the sensitive determination of Melatonin”, **Electrochimica Acta** 211 (2016) 18–26 (CIF: 6.901).
3. **Neeraj Kumar**, Rosy, Rajendra N. Goyal, “A melamine based molecularly imprinted sensor for the determination of 8-hydroxydeoxyguanosine in human urine”, **Talanta** 166 (2017) 215–222 (CIF: 6.057).
4. **Neeraj Kumar**, Rosy, Rajendra N. Goyal, “Palladium nano particles decorated multi-walled carbon nanotubes modified sensor for the determination of 5-hydroxytryptophan in biological fluids”, **Sensors and Actuators B: Chemical** 239 (2017) 1060–1068 (CIF: 7.46).

5. **Neeraj Kumar**, Rajendra N. Goyal, "Silver nanoparticles decorated graphene nanoribbon modified pyrolytic graphite sensor for determination of histamine", **Sensors and Actuators B: Chemical** 268 (2018) 383–391 (CIF: 7.46).
6. **Neeraj Kumar**, Rajendra N. Goyal, "Melamine/Fe<sub>3</sub>O<sub>4</sub> Nanoparticles Based Molecular Imprinted Highly Sensitive Sensor for Determination of Hydrochlorothiazide: An Antihypertensive Drug", **Journal of The Electrochemical Society**, 164 (6) (2017) B240-B246 (CIF: 4.316).
7. **Neeraj Kumar**, Rajendra N. Goyal, "A Simple and Highly Selective Determination of Telmisartan at Sodium Dodecyl Sulfate Modified Pyrolytic Graphite Surface", **Electroanalysis**, 30 (2018) 892–900 (CIF: 3.223).
8. **Neeraj Kumar**, Rosy and Rajendra N. Goyal, "Electrochemical behavior of melatonin and its sensing in pharmaceutical formulations and in human urine", **Current Pharmaceutical Analysis**, 13(1) (2017) 85-90 (CIF: 0.89).
9. **Neeraj Kumar**, Rajendra N. Goyal, Munetaka Oyama, "Electrochemical determination of diacerein, an anti-osteoarthritis drug at unmodified pyrolytic graphite surface", **Journal of The Electrochemical Society**, 166 (16) (2019) B1695-B1700 (CIF: 4.316).
10. **Neeraj Kumar**, Rajendra N. Goyal, "Simultaneous determination of melatonin and 5-hydroxytryptophan at the disposable poly-(melamine)/(o-aminophenol) composite modified screen printed sensor", **Journal of Electroanalytical Chemistry**, 874 (2020) 114458 (CIF: 4.464).
11. **Neeraj Kumar**, Nagaraj P. Shetti, Somanath Jagannath, Tejraj M. Aminabhavi, "Electrochemical sensors for the detection of SARS-CoV-2 virus", **Chemical Engineering Journal**, 430 (2022) 132966 (CIF: 13.273).

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#### **Book chapter:**

1. A book chapter in "Nanomaterial-Based Flexible and Multifunctional Sensors" with entitled "Nanocomposites of Conducting Polymers as Sensors for Detecting Biomolecules and Drugs", authors Mamta Raj, **Neeraj Kumar**, and Rajendra N. Goyal, published by American Scientific Publishers; Edited by Eric Singh and Hari Singh Nalwa (ISBN: 1-58883-257-0) (2019).
2. A book chapter in "Graphene based Biopolymer Nanocomposites" with entitled "Functionalization of Graphene based Biopolymer Nanocomposites for Packaging and Building Applications", authors Prakash Chander Thapliyal and **Neeraj Kumar** publisher Springer; Editor Bhasha Sharma, and Purnima Jain (ISBN: 978-981-15-9179-2) (2021) 251-271.
3. A book chapter in "Hazardous Gases", authors Shuvasish Choudhury, Ajendra Kumar, and **Neeraj Kumar** publisher Elsevier; Silane: Risk assessment, environmental, and health hazard Jaspal Singh, R.D. Kaushik, and Malvika Chawl (ISBN: 978-0-323-89857-7) 1 (2021) 553-561.

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#### **Conferences and Poster Presentation:**

1. An oral presentation on the topic "**Determination of Histamine by using graphene nano-ribbon based nanocomposite modified pyrolytic graphite sensor**" in the International conference on CEAMCR 2018 organized by the Indian Society for ElectroAnalytical Chemistry (ISEAC) during, February 15-17, 2018 at DAE Convention centre, Anushaktinagar, BARC, Mumbai 400094.
2. A poster presentation on "**Silver nanoparticles decorated graphene nano-ribbon modified sensor for determination of histamine**" in the National Seminar on "Recent Trends in Nanobiosensors" (NBS 2018) University of Madras, 22<sup>nd</sup> and 23<sup>rd</sup> Feb 2018.
3. An oral presentation on "**A sodium dodecyl sulfate modified pyrolytic graphite sensor for determination of Telmisartan; an anti-hypertensive drug**" in International Conference on Nanotechnology: Ideas, Innovations and Initiatives (ICN:3I-2017), December 06 - 08, 2017 at IIT Roorkee, Uttarakhand, India.
4. A poster presentation on "**Determination of 5-hydroxytryptophan, a serotonin precursor, by using nano palladium decorated glassy carbon electrode**" in the 12<sup>th</sup> ISEAC Discussion Meet in Electrochemistry (12<sup>th</sup> ISEAC-DM-2016) organized by Indian Society for ElectroAnalytical Chemistry (ISEAC) at The Acres Club, Chembur, Mumbai, India, December 7-8, 2016.

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### **Workshops:**

1. Attended workshop “**Science Academies’ Lecture Workshop on Emerging Trends in Bioinorganic Chemistry**” organized by Department of Chemistry, IIT Roorkee, India, 8-10 March, 2018.
2. Attended workshop on “**Workshop on Reference Management using Mendeley**”, organized by Mahatma Gandhi Central Library, IIT Roorkee, India, 22 November, 2018.
3. Attended workshop on “**Workshop on Research Paper Writing**” organized by Mahatma Gandhi Central Library, IIT Roorkee, India, 9 September, 2017.
4. Attended workshop on “**Author Workshop on Book Publishing**” organized by Mahatma Gandhi Central Library, IIT Roorkee, India, 26 September, 2016.
5. Attended workshop on “**ACS on Campus**” at Chemistry Department, IIT Roorkee, India, 7 February, 2018.
6. Attended webinar on “**Sustainable Buildings & Future Technologies**” organized under the aegis of CSIR Integrated Skill Initiative, CSIR-CBRI Roorkee, India, 13-17 July, 2020.
7. Attended webinar on “**Prior-art Searching with Google Patent**” conducted by Turnip Innovations, 5 September, 2020.
8. Attended the ACS Science Talk *Virtual Lecture Series* on “**Ultra-sensitive sensors that can operate in complex environments**” 4 November, 2020.
9. Attended webinar on “**Copyrights in India**” organized by Turnip Innovations, 20 November, 2020.
10. Attended webinar on “**Electrochemical microsystems for biomedical analysis**” organized by K.L.E. Institute of Technology Hubballi, India, 18 December, 2020.
11. Attended the ACS Science Talk Virtual Lecture Series “**Materials Innovation for Better Living**” on 16 April 2021.
12. Attended “Five-Days Faculty Development Program on “**Recent Trends in BioMEMS and Medical Microdevices: From Devices to Applications**”, organized by National Institute of Technology Silchar, India, 20-24 August, 2021.

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### **Research Experiences:**

#### **Fabrication**

- Synthesis and functionalization of nanoparticles for developing the several voltammetric based electrochemical and biosensors for highly selective determination of biomolecules and drugs.
- The main objective behind the work is to fabrication of different types of polymer-nanocomposite, composite of graphene based metal nano-particle; metal nanoparticles modified carbon nanotubes to fabricate the sensors and their applications in real samples and pharmaceutical samples.
- The mainly two approaches have been used for the fabrication nano-particle composites one is electrochemical and other is chemical methods.
- Molecularly imprinted polymer based sensor for specific detection of molecules.
- The graphene nanocomposites, metal nanoparticles and polymer nanocomposites were characterized by using different techniques such as FE-SEM, EDX, film-XRD, EIS, TEM, HRTEM and Raman spectroscopy.
- The thermal evaporation method for deposition of metal thin-film on silicon wafer.

### **Technical Skills:**

#### **Fabrication and Characterizations Skills**

##### **Characterization:**

UV-Vis Spectroscopy, Bioanalytical system (CV-50, Epsilon, VersaSTAT 3, SP-150), Cyclic Voltammetry (CV), Square Wave Voltammetry (CV), Electrochemical Impedance Spectroscopy (EIS), Raman Spectroscopy, Atomic force Microscopy (AFM), film X-Ray Diffractometer (XRD), Field Emission Scanning Electron Microscope (FE-SEM), EDX, Transmission Electron Microscopy (TEM), High Resolution Transmission Electron Microscopy (HRTEM), High Performance Liquid Chromatography (HPLC).

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### **Computer Skills:**

#### **Simulation (Level: Proficient):**

Origin Pro 8.0, Expert Highscore Plus (XRD analysis), Chemdraw, MS Excel, MS Word, MS Power Point

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**PERSONAL DETAILS:**

Nationality :Indian  
Date of birth :10-March-1993  
Languages :English, Hindi  
Current Address : IPC, Indian Institute of Science Bangalore, Karnataka, India-560012  
Permanent Address :Village and Post- Raipur, Tehsil-Jaspur, Dist. Udham Singh Nagar, Uttarakhand-244712, India

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**Name of References:****1. Dr. R.N. Goyal****Ex Professor, Department of Chemistry,**

Indian Institute of Technology Roorkee,

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**2. Dr. P.C. Thapliyal****Senior Principal Scientist and Professor****Organic Building Materials Group**

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**3. Dr. Veerabhadrarao Kaliginedi****Assistant Professor,****Department of Inorganic and Physical Chemistry,**

Indian Institute of Science

Bangalore, India-560012

Email: [vkaliginedi@iisc.ac.in](mailto:vkaliginedi@iisc.ac.in) or [bhadra.chemistry@gmail.com](mailto:bhadra.chemistry@gmail.com)

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**4. Dr. Anuj Kumar****Ramanujan Fellow & Assistant Professor**

Building Energy Efficiency (BEE),

CSIR-Central Building Research Institute,

Roorkee-247667, India

Email: [anujkumar@cbri.res.in](mailto:anujkumar@cbri.res.in); [anujkumar@ieee.org](mailto:anujkumar@ieee.org),

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I hereby declare that all information's given above are correct to the best of my knowledge.

(Neeraj Kumar)