

Curriculum vitae

Dr. Amritpal Kaur

Assistant Professor

Department of Applied Sciences

Chandigarh College of Engineering, Jhanjeri, Mohali, Punjab

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Education:

Panjab University Chandigarh, India

Ph.D. Interdisciplinary Nano-research/Biophysics (08/10/2015- 06/05/2022)

Title: Synthesis and In Vitro Antibacterial Studies of Drug Coated Metal

Nanoparticles Supervisor: Dr. Rajesh Kumar, Assistant Professor, Department of Physics, Panjab University Chandigarh, India

Punjabi University Patiala, India

MSc Physics (07/07/2011-30/05/2013) (First Division) (83.10%)

BSc Non-Medical (16/07/2008-30/05/2011) (First Division) (76.25%)

Awards and Honors:

Awarded by Maulana Azad National fellowship for five years by University Grants Commission (India) for Ph.D. research work (08/10/2015 to 08/10/2020).

This five-year fellowship is awarded by University Grants Commission (One of the top Funding agencies in India) for PhD Program. This fellowship is awarded to the students with outstanding School and College Academic Record.

Awarded by International Travel Grant by Department of Science and Technology (India) for attending and presenting my research work at an international conference held in Spain (June, 2019).

I had fruitful research experience and discussions with leading Physicists, Chemists and Biologists from all around the world. At this conference, I presented the **Role of different surfactants as a mediator for glycopeptide coated gold nanoparticles (AuNPs)**. The results infer that different surfactant could be used as vehicles for delivery of glycopeptides and also, could be used as a system to enhance the antibacterial activity against multi-drug resistant bacteria through synergetic effect.

Qualified Graduate Aptitude Test in Engineering (17/03/2018).

This a National level Test in India conduct by IIT's every year to select students for Engineering courses in IIT's (Indian Institute of Technology)

Got 3rd Rank in Panjab University Entrance Examination for Ph.D.

College Color and Roll of Honor in MSc and BSc and Certificate of Merit in BSc III (23/04/2015).

College Color and Roll of Honor are two prestigious awards in College in India. Both are awarded to the top achievers of the college. I have been awarded by these awards in both MSc and BSc. A certificate of Merit is also awarded alongwith these honors to the toppers of the college.

Certificate of Merit in Talent Search Examination organised by Sahil Study Circle, Chandigarh, India (18/12/2007).

This is conducted by study centre after matriculation to select students for high school.

“Merit award” in Matriculation (in merit) by Punjab School Education Board (15/05/2006).

This certificate is awarded by School for scoring state level position in matriculation exam. Matriculation is very important academic class in India.

Research Interests:

My research interests are focused on the

- synthesis of nano-composites with varying size and shapes.
- applications of nanomaterials in targeted drug delivery applications.
- design of novel materials against antimicrobial resistance.
- surface modification of different nanomaterials for targeted drug delivery applications

Technical Skills:

- Expertise in synthesis of nanomaterials by chemical method through bottom-up approach, characterisation (UV- Visible spectroscopy, FTIR, XRD) and in vitro antimicrobial experiments through agar well diffusion method.
- Have skills in writing and drafting of manuscripts.
- Expertise in handling lab equipment/software such as origin software, MS office, UV-Vis Spectrophotometer, and X-Ray Diffractometer.

Research Experience:

Panjab University, Chandigarh, India

During My PhD, first two years I served as Junior Research Fellow and the remaining three years I served as Senior Research Fellow. During this tenure, I synthesised metal (silver and gold) nanoparticles in the presence of different capping agents or surfactants by chemical method. The main aim was to study the role of different surfactants as intermediators for glycopeptides and aminoglycosides by combining physics with chemistry and biology. Surfactant assisted metal nanoparticles were functionalised with two different class of antibiotics: one belonging to glycopeptide and the other an aminoglycoside. The interaction mechanism by which drugs attached to metal nanoparticles surface through surfactants were explored by using different analytical techniques such as UV-Visible absorption spectroscopy, FTIR, TEM, DLS and XRD.

Results and new findings: The results infer that citrate is a good linker for vancomycin but not for amikacin in the case of citrate-AgNPs. However, with citrate-AuNPs, the citrate acts as a linker for both the drugs. It was due to the formation of unstable sulphur compounds for AgNPs. XRD results confirmed the formation of sulphur compounds which destruct the FCC crystal structure of AgNPs with the formation of new planes observed. In vitro antibacterial activity of formed drug conjugates were studied against *S.aureus* (Gram-positive) and *E.coli* (Gram-negative). The results show the enhanced in vitro antibacterial activity of drug conjugates with metal nanoparticles against both strains. *E.coli* is a vancomycin resistant bacterium which also became vancomycin sensitive after treated

with vancomycin conjugated silver and gold nanoparticles. Therefore, synergetic effect of drug coated metal nanoparticles has been observed. All the results have been published in reputed international journals.

Teaching Experience:

Guru Gobind Singh College for Women, Chandigarh, India. (16/08/2022-30/04/2024)

Effectively teaching the following courses to undergraduate students.

- Major Courses: Optics and Lasers
- Statistical Mechanics
- Condensed Matter Physics
- Materials Science
- Practical Lab: BSc I, II and III.
 - Plan their timetable and exam papers and implement them accordingly.
 - Motivating students to participate in different curriculum activities.
 - Guided students with adjustment or academic problems.
 - Assisting and learning administrative duties.
 - Provided administrative support to the college with admissions.
 - Member of NAAC Criteria 3 team.
 - Co-Convener (Science Fest).

Khalsa College Patiala, Punjab, India. (18/07/ 2013- 07/10/ 2015)

Effectively taught the following courses to both undergraduate and postgraduate students

- Major Courses: Classical Mechanics
- Nuclear Physics
- Nanotechnology
- Quantum Mechanics
- Practical Lab: BSc I, II and III.
 - Provided administrative support to the college with admissions.
 - Planned and set exam papers along with paper marking.
 - Assisted and helped postgraduate students to identify research problem for their research project.

Supervisor: Undergraduate Project Supervision (05 students)

- Helped students to identify topic and title of research project.
- Supervised and guided students with research experiment and data analysis.
- Helped the students in writing and submission of final report.

Publications:

<https://scholar.google.co.in/citations?user=TZ24G9EAAAAJ&hl=en> scholar
[HYPERLINK "https://scholar.google.co.in/citations?user=TZ24G9EAAAAJ&hl=en".google.co.in](https://scholar.google.co.in/citations?user=TZ24G9EAAAAJ&hl=en)

Peer Reviewed Publications

- **Amritpal Kaur**, Future and role of bacteriocins as antimicrobial in food safety applications, *Pramana Research Journal*, 13, 2023, 7-14.
- **Amritpal Kaur** and Rajesh Kumar, Formulation of biocompatible vancomycin conjugated gold nanoparticles for enhanced antibacterial efficacy, *ES Energy and Environment*, 15, 2022, 34-44.

- **Amritpal Kaur** and Rajesh Kumar, Untangling the effect of surfactants as an intermediate at gold nanoparticle- antibiotic interface for enhanced antibacterial efficacy, *ES Food and Agroforestry*, 7, 2022, 30-40.
- **Amritpal Kaur** and Rajesh Kumar, Effect of trisodium citrate as an intermediate at metal nanoparticle/aminoglycoside antibiotic interface, *SPAST Abstracts*, 1 (01), 2021.
- **Amritpal Kaur** and Rajesh Kumar, Enhanced bactericidal efficacy of polymer stabilised silver nanoparticles in conjugation with different classes of antibiotics, *RSC advances*, 9, 2019, 1095-1105.
- **Amritpal Kaur**, Simran Preet, Vivek Kumar, Rajeev Kumar and Rajesh Kumar, Synergetic effect of vancomycin loaded silver nanoparticles for enhanced activity, *Colloids and Surfaces B: Biointerfaces*, 176, 2019, 62-69.
- **Amritpal Kaur** and Rajesh Kumar, Mechanistic Investigation of Vancomycin-Silver Nanoparticles Surface Interaction, *AIP Conf. Proc.*, 2115, 2019, 030071-1–030071-4.
- **Amritpal Kaur** and Rajesh Kumar, Synthesis and antibacterial studies of glycopeptide coated citrate/PVP-capped silver nanoparticles: A brief study, *Trends and Challenges in Physics*, 2019, 18-21.
- **Amritpal Kaur**, Divya Goyal and Rajesh Kumar, Surfactant mediated interaction of vancomycin with silver nanoparticles, *Applied Surface Science*, 449, 2018, 23-30.

Book Chapter

- Synthesis, Characterization and Optical Properties of Novel Silver and Gold Nanoparticles in the Presence of Different Surfactants
Amritpal Kaur and Rajesh Kumar, Agra Book International, 1, 2023, 35-55, ISBN:978-93-94151-12-3.

Papers Presented in International/National Conferences

- Paper presentation in National Physics Conference (NPC-01) organised by PG Department of Physics, Khalsa College Patiala, Punjab. (October, 2014)
- Poster presentation in 2nd International Conference on “Harnessing Engineering, Technology and innovation for Sustainable Growth (HETIS-2016)” at Dr. S. S. Bhatnagar University Institute of Chemical Engineering & Technology, Panjab University, Chandigarh. (September 30-October 1, 2016)
- Poster presentation in National Conference on “Green Nanotechnology (GRANTE-II-2016)” at Department of Applied Sciences, Chandigarh University. (November 15-16, 2016)
- Poster presentation in “11th Chandigarh Science Congress, CHASCON 2017” at Panjab University, Chandigarh. (March 9-11, 2017)
- Poster presentation in 4th International Conference on “Nanoscience and Nanotechnology (ICCON-2017)” at Department of Physics and Nanotechnology, SRM University, Chennai, Tamil Naidu. (August 9-11, 2017)
- Poster presentation in NanoSciTech on “Expanding Horizons of Nanotechnology” at Panjab University, Chandigarh. (November 08-10, 2017)
- Poster presentation in international conference on “Science and Technology: Trends and Challenges” at Gujranwala Guru Nanak Khalsa Collage, Ludhiana, Punjab. (April 16-17, 2018)
- Poster presentation in Research conclave at Indian Institute of Technology, Ropar, Punjab. (April 21, 2018)
- Poster presentation in 63rd DAE Solid State Physics Symposium at Guru Jambheshwar University of Science and Technology, Hisar, Haryana. (December 18-22, 2018)

- Poster presentation in international conference on “9th International Colloids Conference” organised by Elsevier in Sitges, Barcelona, Spain. (June 16-19, 2019)
- Poster presentation in “ICONICA 2020-A Global Summit on Next-Gen Paradigms in Health Care” at Panjab University, Chandigarh. (February 12-14, 2020)
- Poster presentation in “6th International conference on Nanoscience and Nanotechnology” organised by SRM Institute of Science and Technology, Chennai, Tamil Naidu. (February 1-3, 2021)
- Poster presentation in “2nd World Congress on Nursing & Healthcare Summit-2021” organised by BioGenesis Health Cluster, Bengaluru, India. (October 3, 2021)

Participation in Workshops/Seminars

- Participated in National Workshop on “UV-Vis., FTIR, XRD, FE-SEM and TEM Techniques under TEQIP-II” at Dr. S. S. Bhatnagar University Institute of Chemical Engineering & Technology, Panjab University, Chandigarh. (April 25-30, 2016)
- Participated in National Workshop on “Electrochemistry” at Department of Chemistry, Panjab University, Chandigarh. (October 24-25, 2016)
- Participated in National Workshop on “Research Methodology under TEQIP-II” at Dr. S. S. Bhatnagar University Institute of Chemical Engineering & Technology, Panjab University, Chandigarh. (March 20-22, 2017)
- Participated in National Workshop on “X-Ray Powder Diffraction (NXRD-2017)” at Department of SAIF/CIL, Panjab University, Chandigarh. (July 6-7, 2017)
- Participated in “National Workshop cum Symposium on “The integration of Biological methods in the Nano field of Chemistry” at Department of SAIF/CIL, Panjab University, Chandigarh. (2017)
- Participated in National Workshop on “FTIR & UV- Vis-NIR” at Department of SAIF/CIL, Panjab University, Chandigarh. (2017)
- Participation in National workshop on “Research Methodology under TEQIP-II” at Dr. S. S. Bhatnagar University Institute of Chemical Engineering & Technology, Panjab University, Chandigarh. (September 17-19, 2018)
- Participation in international workshop on “Peptide and Nanotechnological Approaches for Novel Theranostics” at Department of Chemistry, Panjab University, Chandigarh. (October 31, 2019)
- Participated in International virtual conference on “Advanced Nanomaterials Applications (VCAN 2020)” organised by Centre for Nanotechnology Research (CNR), Vellore Institute of Technology, Vellore, India. (June 17- 19, 2020)
- Participated in online webinar on “Skills of Public Speaking” organised by Panjab University, Chandigarh. (July 07, 2020)
- Participated in one day National Symposium on “Shri Guru Teg Bahadur Ji: Life and Teachings” organised by Gujranwala Guru Nanak Khalsa College, Ludhiana, Punjab. (August 04, 2020)
- Participated in Three-day International Webinar Series on “Synthesis and Characterization of Nano-materials and their Novel Applications” organised by Rajiv Gandhi University of Knowledge Technologies, Andhra Pradesh. (August 17-19, 2020)
- Participated in one day International Webinar on “Supercapacitors: A Futuristic Energy Storage Device” organised by Shri Satya Sai College for Women, Bhopal. (August 20, 2020)
- Participated in four-day International Webinar Series on “Modern Approach on Magnetism and Material Science in Engineering” organised by Department of Physics, Maharaja Institute of Technology, Mysore. (September 15-18, 2020)

- Participated in one day International Webinar on “Innovative Data Analytics Tools for Chemical and Life Sciences Research” organised by Jharkhand Chemical Society, Ranchi. (September 20, 2020)
- Participated in one day virtual webinar on “Structuring lattice using meta-atoms in metamaterials” organised by Applied Photonics Initiative, IISC, Bangalore. (October 03, 2020)
- Participated in one day virtual webinar on “Non-invasive cancer devices from ideation to a product: An entrepreneur journey” organised by Applied Photonics Initiative, IISC, Bangalore. (October 15, 2020)
- Participated in webinar on “Mendeley Data Technica “Deep Dive” organised by Elsevier. (November 05, 2020)
- Participated in one day webinar on “Black Holes Everywhere” organised by OSA THE OPTICAL SOCIETY (IIT Delhi Student Chapter). (December 15, 2020)
- Participated in “Five Day Online Lecture Series” organised by P.G. Department of Physics, Khalsa College Patiala, Punjab. (December 22-26, 2020)
- Participated in International event “Celebrating Women in Science and Technology” organised by Centre for Nanotechnology Research, Vellore, India. (February 11, 2021)
- Participated in “World Nano Congress on Advanced Science and Technology (WNCST 2021) organised by Centre for Nanotechnology Research, Vellore, India. (March 08-13, 2021)
- Participated in “2nd World Congress on Nursing & Healthcare Summit-2021” organised by BioGenesis Health Cluster, Bengaluru, India. (October 3, 2021)
- Participated in Nano E -Talks organised by Maharaja Agrasen University, Baddi, Himachal Pradesh, India. (December 11, 2021)
- Participated in 4th International Congress on Infectious diseases & Antibiotics-2023 organised by BioGenesis Health Cluster, Bengaluru, India. (January 22, 2023)
- Participated in International e-Symposium on Materials Development and Scale-up for Membrane Separation, Sensing, Energy and Biological Applications (MDS-MSEB-2023)” organised by Department of Chemical Engineering, SRM University, Chennai. (January 24-25, 2023)
- Participated in National Workshop on “Significance of e-Resources in Teaching, Learning and Research” organized by Guru Gobind Singh College for Women, Sector-26, Chandigarh. (September 13, 2023)
- Participated in National workshop on “Innovative AI Tools for Research and Education” organized by Guru Gobind Singh College for Women, Sector-26, Chandigarh. (September 28, 2023)
- Attended online Training Workshop on “Quantum Technology Spin Qubit Semiconductor Modeling & Simulation Using QTCAD TCAD software” organised by Nano academic Technologies. (January 10, 2024)
- Participated in Workshop on “Sustainable Practices (Millets: Miracle Food for Future) organised by Department of Science, Guru Gobind Singh College for Women, Sector 26, Chandigarh. (February 13, 2024)
- Participated in Webinar on “A Journey from Ferrites to Batteries” conducted by Department of Physics, School of Sciences and Humanities, Warangal, India. (June 01, 2024)
- Participated in Webinar on “Green nanocomposites for water treatment for the removal of trace organic contaminants” conducted by Department of Physics, School of Sciences and Humanities, SR University, Warangal, India. (June 05, 2024)

- Participated in the “Two -Day Workshop on Python for Data Analysis using AI” organized by Department of Research & Publications, A2Z EduLearningHub LLP, India. (June 18-19, 2024)
- Participated in the “Two -Day Workshop on Essential AI Tools for Teachers, Students and Reserachers” organized by Department of Research & Publications, A2Z EduLearningHub LLP, India. (July 08-09, 2024)

FDPs/Teacher Training Programmes/Refresher Courses/FIPs:

- Completed the NEP 2020 Orientation & Sensitization Programme under Malaviya Mission Teacher Training Programme of UGC organized by Centre for Professional Development in Higher Education, University of Delhi. (February 20-29, 2024)
- Participated in AICTE Recognised Faculty Development Programme on “NEP-2020: Science and Technology” conducted by Applied Science Department at NITTTR, Chandigarh. (May 13-17, 2024)
- Attended Five Days Faculty Induction Programme on "Quality Assurance in Higher Education" organised by Sri Guru Granth Sahib World University, Fatehgarh Sahib. (July 29-August 02, 2024)

Short Term Courses Attended:

- Participated in 2nd Internship program organised by Centre for Bioscience and Nanoscience Research, Coimbatore, Tamil Naidu, India. (June 22-July 06, 2020)
- Attended Online course on “Remote Sensing Applications in Agricultural Water Management” conducted by Indian Institute of Remote Sensing (IIRS), Dehradun. (August 03- 07, 2020)
- Attended one week Online Short-Term Course on “Recent Advances in Nanoscience and Nanotechnology (RANN-2020) under TEQIP-III organised by Department of Physics, National Institute of Technology, Srinagar, J & K, UT. (August 24-28, 2020)
- Successfully completed the online course ACS Reviewer Lab on “Principles of High- Quality Peer Review” organised by American Chemical Society (ACS). (September, 2020)
- Successfully completed the short-term course on “Novel Multifunctional Materials” sponsored by TEQIP-III and organised by Department of Applied Physics, Punjab Engineering College (Deemed to be University), Chandigarh. (January 11-16, 2021)
- Successfully completed 30 hours online certificate course in “Basics in Genomics and Proteomics” organised by Microbiologists Society India. (January 29 to February 07, 2022).