

## **Project Idea**

A sustainable, integrated process has been developed to transform agro-biomass waste—such as wheat straw into high-value bioproducts, using lignin as the key renewable raw material. Lignin is extracted through an eco-friendly soda method and converted into lignin nanoparticles (LNPs) via solvent–antisolvent nanoprecipitation. These LNPs are utilized to fabricate multifunctional materials with diverse industrial applications.

- A proof of concept (POC) has been successfully established, and the process is designed to be **low-cost**, **scalable**, and adaptable to local **agro-waste sources**, supporting a circular bioeconomy.
  - This approach not only transforms agricultural waste into a high-value material but also addresses multiple environmental issues simultaneously, **reducing plastic pollution**, **minimizing residue burning**, and **lowering carbon emissions**.
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## **Curriculum Vitae**

### **Dr. Seema Kirar, M. Tech. (Pharm.), Ph.D.**

Women Scientist (DST-WOSA Fellow)

Department of Bioproduct chemistry, BRIC-National Agri-Food and Biomanufacturing Institute (NABI), Formerly Center of Innovative Applied and Bioprocessing (CIAB), Department of Biotechnology, Govt. of India, SAS Nagar-140306, India.

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### **Areas of interest**

Bio-therapeutics, bio-pharmaceutics, pharmaceutical sciences, bio-manufacturing, lignin valorization, photodynamic therapy, biomass-derived nanomaterial formations, photocatalysis, drug discovery and development.

### **Academic credentials**

### **Professional experience**

- DST-WOSA Fellow at BRIC-NABI, Formerly-Center of Innovative and Applied Bioprocessing (CIAB), SAS Nagar, Punjab, India, from 12 July 2023 to till date.

- Postdoctoral Research Associate in the Department of Nanotechnology and Application Technology at the Center of Innovative and Applied Bioprocessing (CIAB), SAS Nagar, Punjab, India, from 10<sup>th</sup> February 2021 to 3 July 2023.
- Lecturer in Department of Pharmacy at University of Kota, Kota, Rajasthan, India from 20<sup>th</sup> Sept. 2019 to 31<sup>st</sup> Jan. 2021
- NRHM Pharmacist August 2013- December 2013

### Professional achievements

- Awarded with the Women Scientists Scheme-A (**DST-WOSA**) in 2022
- Received **DBT-SRF** July 2018
- Received **DBT-SRF** July 2016
- Received **DBT-JRF** July 2014
- Qualified **CSIR-JRF-NET** June 2013, **AIR 39**
- Qualified **NIPER-JEE** June 2014, **AIR 2**
- Qualified **GATE** in Life Sciences 2013
- Qualified **GATE** in Life Sciences 2011
- Qualified **NIPER-JEE-2011** conducted by NIPER, Mohali, with AIR 210
- Qualified **GPAT** in 2011, AIR 779
- Received **fellowship** under **DBT-sponsored** post-graduate programme in M. Tech. (Pharm.) course (2011-2013), at NIPER Mohali by qualifying GPAT and NIPER JEE, subsequently

### Awards

- Awarded with **DST-DST** (Sanctioned funds **38,96,160/-**)
- **Best oral presentation award** at RABMC National Symposium held at IIT Ropar, Punjab, India, 2025.
- **Best oral presentation award** at ICRABR international conference held at SSS-NIBE, Kapurthala, Jalandhar, Punjab, India, 2025.
- **Best oral presentation award** at ICRABR international conference held at SSS-NIBE, Kapurthala, Jalandhar, Punjab, India, 2023.
- **Best poster award** at the AsBIC9 conference held at NUS, Singapore, 2018
- **Best poster award** at 3<sup>rd</sup> CRIKC at CSIR-CSIO, Chandigarh, India, 2017
- **Best poster award** and **100 Euros for purchasing eBooks from Springer** at the 1<sup>st</sup> International Conference on SEEC at CIAB, India, 2017
- Awarded with **DST-SERB travel grant** (Government of India)
- Awarded with **ICMR travel grant** (Government of India)
- Awarded with the **AsBIC9 travel grant** by SBIC Singapore 2018
- Awarded with the **NWC travel grant** by San Francisco, USA

### Memberships

- Member of ACS (Community Associate no. 32946883)
- Member of RSC
- Life membership of Biotech Research Society of India (BRSI)
- Life membership of Material Research Society of India (MRSI)
- Life membership of Chemical Research Society of India (CRSI)

- Life membership of Indian Pharmaceutical Association (IPA)
- Life membership of Indian Photobiology Society (IPS)
- Life membership of Indian Pharmacological Society (IPS)

## Research & training

- **Ph. D. Thesis:** “*Design and synthesis of nano-photosensitizers for various biomedical applications*”  
Supervisor: **Prof. U. C. Banerjee**, Co-supervisor: **Dr. J. K. Laha** (07/2014 to 07/2019) Study includes:  
  - Synthesis and characterization of Porphyrinic photosensitizers (*trans*-AB porphyrin and A4-porphyrin)
  - Synthesis and characterization of Non-porphyrinic photosensitizers (BODIPYs 25 molecules)
  - Synthesis of bioinspired silver and gold nanoparticles and gelatin nanoparticles
  - Development and characterization of Nanophotosensitizers (27 molecules) to overcome limitations of existing PSs (FDA approved Photophrin)
  - Determination of Singlet oxygen generation, Fluorescence quantum yield, drug release studies, stability studies of synthesized photosensitizers and nano-photosensitizers
  - Estimation of antibacterial and anticancer activity of synthesized photosensitizers and nano-photosensitizers
- **M.S. Pharm. Thesis:** “*Synthesis and biological evaluation of 6-substituted imidazopyridines as potential topoisomerase-II inhibiting anticancer agents*” Supervisor: **Prof. U. C. Banerjee**, Co-supervisor: **Dr. S. K. Guchhait** (06/2012 to 06/2013)

## List of publications

1. **S. Kirar\***, A. K. Pujari, S. De, J. Bhaumik, Therapeutic Potential of BODIPY-Based Lignin Nanosensitizers as Sustainable ROS Generators, *ChemistrySelect*, 2026, 11 (9), e06468, <https://doi.org/10.1002/slct.202506468>
2. K. Rawat, R. Kaur, A. K. Pujari, K. Gogde, D. Mohne, **S. Kirar**, Y. N. Reddy, P. R. Yadav, P. Y. Khandave, A. H. Pande, and J. Bhaumik, Lignin-based biopharmaceuticals from nature to medicine: current trends, future prospects and emerging challenges, **Just accepted**, DOI: [10.1039/D5LF00377F](https://doi.org/10.1039/D5LF00377F)
3. R. Kaur, **S. Kirar**, N. Y. Reddy, J. Bhaumik, Lignin-Based Sustainable Nanophotocatalysts for the Removal of Common Pollutants from Wastewater, *ChemNanoMat*, 2025, e202500080. IF: 2.6. <https://doi.org/10.1002/cnma.202500080>
4. A. K. Pujari, **S. Kirar**, K. Rawat, K. Gogde, J. Bhaumik, Designing Lignin-Based Nanophotocomposites as Reactive Oxygen Species Generators for Inactivating Candida Strains, *Journal of Medicinal Chemistry*, 2025, 68, 10, 10314–10328. IF: 6.8. <https://doi.org/10.1021/acs.jmedchem.5c00482>
5. M. Meenu, A. K. Pujari, **S. Kirar**, Mansi, A. Thakur, M. Garg, J. Bhaumik, Development of bionanocomposite packaging films based on lignin nanoencapsulated anthocyanins extracted from agro-waste for enhancing the post-harvest shelf life of tomatoes,

Sustainable Food Technology, 2025, 3 (2), 414-424. IF: 5.3.  
<https://doi.org/10.1039/D4FB00342J>

6. K. Gogde, **S. Kirar**, A. K. Pujari, D. Mohne, A. K. Yadav, J. Bhaumik, Near-IR nanolignin sensitizers based on pyrene conjugated chlorin and bacteriochlorin for ROS generation, DNA Intercalation and bioimaging. *J Mater Chem B*. 2025, 13, 288-304. IF: 5.7 <https://doi.org/10.1039/D4TB01627K>
7. K. Rawat, R. Kaur, A. K. Pujari, **S. Kirar**, J. Bhaumik, Lignin-derived gold-titanium dioxide nanophotocomposites as potent photoactivatable probes for microbial inactivation, *ACS Appl. Bio Mater.* 2024, 7, 11, 7666–7674. IF: 4.7.  
<https://doi.org/10.1021/acsabm.4c01238>
8. B. Gautam, **S. Kirar**, Y. N. Reddy, K. Rawat, J. Bhaumik, Lignin nanoparticles as smart delivery vehicles for ginseng assisted treatment of microbial infection, *ACS Appl. Nano Mater.* 2024, 7, 14, 17101–17110. IF: 5.3.  
<https://doi.org/10.1021/acsanm.4c03461>
9. S. Paul, A. De, **S. Kirar**, N. S. Thakur, A. K. Pujari, K. Gogde, J. Bhaumik, Co-Administration of Chemo-Phototherapeutic Loaded Lignin Nanoarchitecture for the Treatment of Skin Cancer and Infection, *ACS Applied Nano Materials*, 2024, 7, 9, 10984–10997. IF: 5.5. <https://doi.org/10.1021/acsanm.4c01936>
10. **S. Kirar**, D. Mohne, M. Singh, V. Sagar, A. Bhise, S. Goswami, J. Bhaumik, Eco-Friendly Lignin Nanocomposite Films as Advanced UV Protective and Antimicrobial Sustainable Packaging Materials, *Sustainable Materials and Technologies*, 2024, 40, e00864. IF: 9.2. <https://doi.org/10.1016/j.susmat.2024.e00864>
11. Y. N. Reddy, **S. Kirar**, N. S. Thakur, M. D. Patil and J. Bhaumik, Solar photocatalytic degradation of lignin using Recyclable metalloporphyrin/light harvesters, *ACS Sustain. Chem. Eng.*, 2023, 11, 12, 4568–4579. IF: 7.3.  
<https://doi.org/10.1021/acssuschemeng.2c05917>
12. A. Vashistha, S. Kumar, **S. Kirar**, N. Sharma, B. Das, U. C. Banerjee, S. V. Pawar, R. Kumar, A. K. Yadav, Synthesis, biological evaluation and in silico studies of 2-aminoquinolines and 1-aminoisoquinolines as antimicrobial agents, *Computational Biology and Chemistry*, 2023, 102, 107807. IF: 3.1.  
<https://doi.org/10.1016/j.compbiolchem.2022.107807>
13. **S. Kirar**, Y. N. Reddy, U. C. Banerjee, J. Bhaumik, Development of meso-substituted heterocyclic BODIPY-based polymeric nanoparticles for pathogen inhibition using photodynamic therapy, *ChemPhotoChem*, 2022, 7(2), e202200172. IF: 3.  
<https://doi.org/10.1002/cptc.202200172>
14. **S. Kirar**, N. S. Thakur, Y. Nikhileshwar Reddy, U. C. Banerjee, J. Bhaumik, Insights on polypyrrole based nanoformulations for photodynamic therapy, *Journal of Porphyrins and Phthalocyanines*, 2021, 25, 605-622. IF: 0.9.  
[10.1142/s1088424621300032](https://doi.org/10.1142/s1088424621300032)

15. **S. Kirar**, D. Chaudhari, N. S. Thakur, S. Jain, J. Bhaumik, J. K. Laha, U. C. Banerjee, Light-Assisted Anticancer Photodynamic Therapy Using Porphyrin-Doped Nanoencapsulates, *J. Photochem. Photobiol. B.* 2021, 220, 112209 IF: 3.7. <https://doi.org/10.1016/j.jphotobiol.2021.112209>
16. N. S. Thakur, N. Mandal, G. Patel, **S. Kirar**, Y. Nikhileshwar Reddy, V. Kushwah, S. Jain, Yogeshvar N. Kalia, J. Bhaumik, U. C. Banerjee, Co-administration of zinc phthalocyanine and quercetin via hybrid nanoparticles for augmented photodynamic therapy, *Nanomedicine: NBM*, 2021, 33, 102368. IF: 4.6. <https://doi.org/10.1016/j.nano.2021.102368>
17. S. Tiwari, **S. Kirar**, U. C. Banerjee, N. K. Balu, S. Singh, I. P. Singh, Synthesis and Biological Evaluation of Quinoline-Quinazolinones for Antimicrobial and Antileishmanial Potential, *J. Indian Chem. Soc.*, 2020, 97, 1251-1258. IF: 3.4. [https://indianchemicalsociety.com/portal/uploads/journal/2020\\_08\\_9\\_Extended\\_160557425\\_2.pdf](https://indianchemicalsociety.com/portal/uploads/journal/2020_08_9_Extended_160557425_2.pdf)
18. S. Tiwari, **S. Kirar**, U. C. Banerjee, N. K. Balsu, S. Singh, P. P. Singh, I. P. Singh, Synthesis of N-substituted indole derivatives as potential antimicrobial and antileishmanial agents, *Bioorganic Chemistry*, 2020, 99, 103787, IF: 4.7. <https://doi.org/10.1016/j.bioorg.2020.103787>
19. Y. Nanaji, **S. Kirar**, S. Pawar, A. Yadav, A mild and metal-free synthesis of 2-and 1-alkyl/aryl/dialkyl-aminoquinolines and isoquinolines, *RSC Advances*, 2020, 10 (13), 7628-7634, IF: 4.6. <https://doi.org/10.1039/C9RA10397J>
20. **S. Kirar**, N. S. Thakur, J. K. Laha and U. C. Banerjee, Porphyrin Functionalized Gelatin Nanoparticle-Based Biodegradable Phototheranostics: Potential Tools for Antimicrobial, *ACS Appl. Bio Mater.* 2019, 2, 10, 4202-4212, IF: 4.6. <https://doi.org/10.1021/acsabm.9b00493>
21. **S. Kirar**, N. S. Thakur, J. K. Laha, J. Bhaumik, U. C. Banerjee, Development of Gelatin Nanoparticle-Based Biodegradable Phototheranostic Agents: Advanced System to Treat Infectious Diseases, *ACS Biomater. Sci. Eng.* 2018, 4(2), 473–482, IF: 5.5. <https://doi.org/10.1021/acsbiomaterials.7b00751>
22. P. Sehajpal, **S. Kirar**, S. Ghosh, U. C. Banerjee, Generation of novel family of reductases from PCR based library for the synthesis of chiral alcohols and amines, *Enzyme and Microb Technol.* 2018, 118, 83–91, IF: 3.7. [10.1016/j.enzmictec.2018.07.006](https://doi.org/10.1016/j.enzmictec.2018.07.006)
23. J. K. Laha, S. Sharma, **S. Kirar**, U. C. Banerjee, Design, Sustainable Synthesis, and Programmed Reactions of Templated N-Heteroaryl Fused Vinyl Sultams, *J Org Chem.* 2017, 82(18), 9350–9359, IF: 3.7. <https://doi.org/10.1021/acs.joc.7b01340>
24. N. S. Thakur, J. Bhaumik, **S. Kirar**, U. C. Banerjee, Development of Gold-Based Phototheranostic Nanoagents through a Bioinspired Route and Their Applications in Photodynamic Therapy, *ACS Sustainable Chem. Eng.* 2017, 5(9), 7950–7960, IF: 7.3. <https://doi.org/10.1021/acssuschemeng.7b01501>

25. J. Bhaumik, G. Gogia, **S. Kirar**, L. Vijay, N. S. Thakur, U. C. Banerjee and J. K. Laha, Bioinspired nanophotosensitizers: synthesis and characterization of porphyrin–noble metal nanoparticle conjugates, *New J. Chem.* 2016, 40, 724–731, IF: 2.5. <https://doi.org/10.1039/C5NJ02056E>

### Book chapter

1. J. Bhaumik, **S. Kirar**, J. K. Laha, Theranostic nanoconjugates of tetrapyrrolic macrocycles and their applications in photodynamic therapy, Book chapter no 22, Publisher: Springer, Book Title: Redox-Active Therapeutics, 2016, 509–524. ISBN No. 978-3-319-30705-3

### Patents

1. Development of lignin-derived bioleather and applications thereof, Jayeeta Bhaumik, Nitish Kumar, Anuj Sharma, **Seema Kirar**, Devesh Mohne, Shubhi Katiyar (Indian patent 202511094413).
2. Development of lignin-derived biomulch films and applications thereof, Jayeeta Bhaumik, Nitish Kumar, Anuj Sharma, **Seema Kirar**, Devesh Mohne, Shubhi Katiyar (Indian patent 202511094414).
3. Nanoencapsulation of anthocyanins extracted from food and agro-industrial waste using biocompatible materials and applications thereof, Maninder Meenu, Jayeeta Bhaumik, Monika Garg, **Seema Kirar**, Anil Kumar Pujari (Indian patent 202311083795).
4. Process for the production of nanofilm through agro-biomass derived lignin and applications thereof. Jayeeta Bhaumik, Saswata Goswami, **Seema Kirar**, Manali Singh, Devesh Mohne. (Indian patent 202211070754). **NDA** signed with Hauch Ecovation Pvt. Ltd, Ludhiana, Punjab, India.
5. Lignin based polypyrrole nanoformulations as highly effective antiviral agents against SARS-CoV-2. Bhaumik J, Vrati S, Reddy YN, Chandna S, Paul S, Kaur R, Agarwal S, Chandru S. and **Kirar S.** (Indian patent 202111014735).

### Research presentations (National and International)

- **Oral presentation** at BioMANTHAN International conference held at IIT, Ropar, India, 2025.
- **Oral presentation (Best oral presentation award)** at RABMC National Symposium held at IIT, Ropar, India, 2025.
- **Poster presentation** at IPC-IPSCON 2025, International pharmacology conference, 55th annual conference of Indian pharmacological society, UIPS, PU, Panjab, India.
- **Oral presentation** at CHASCON conference held at Panjab University, Chandigarh, India, 2025.
- **Oral presentation (Best oral presentation award)** at ICRABR international conference held at SSS-NIBE, Kapurthala, Jalandhar, Punjab, India, 2025
- **Oral presentation** at the SMST international conference held at INST, Mohali, Punjab, India, 2024
- **Poster presentation** at RABMC National Symposium held at PU, Chandigarh, India, 2024
- **Poster presentation** at ETPP international conference held at IISER, Mohali, Punjab, India, 2024
- **Oral presentation** at ICRABR international conference held at SSS-NIBE, Kapurthala, Jalandhar, Punjab, India, 2023 (**Best oral presentation award**)

- **Oral presentation** at CHASCON conference held at Panjab University, Chandigarh, India, 2023
- **Poster presentation** at TENS international conference held at INST, Mohali, Punjab, India, 2023
- **Oral presentation** ‘4 Minute Research Pitch’ on a National event jointly organized by Dept. of Chemistry, IIS (Deemed to be University), Jaipur and Govt. Science PG college, Ujjain on 15-16 April 2022 as a participant and presented a paper titled ‘Development of nanophototherapeutics for pathogen inhibition’
- **Poster presentation** at the AsBIC9 conference held at NUS, Singapore, 2018
- **Poster presentation** at ACS on campus event held at IISER, Mohali, India, 2018
- **Poster presentation** at the International Symposium in NIPER, India, 2018
- **Poster presentation** at 2<sup>nd</sup> INNOPHARM, Bhopal, M.P., India, 2017
- **Poster presentation** at 3<sup>rd</sup> CRIKC at CSIR-CSIO, Chandigarh, India, 2017
- **Poster presentation** at the 1<sup>st</sup> International Conference on SEEC at CIAB, India, 2017
- **Poster presentation** at 4<sup>th</sup> ICANN IIT, Guwahati 2015

### Invited talks

1. Delivered a lecture on the topic “Biodegradable nanophotosensitizers: A device designed for anticancer photodynamic therapy” in ‘Women’s health awareness camp’ organized by ‘Snchi Sakhi Women Empowered Society’, Jhalawar, Raj. from 7<sup>th</sup> Oct. 2023 as a source person.
2. Delivered a lecture on the topic “Eco-friendly lignin nanofilms: Advanced UV protective and antimicrobial sustainable packaging material” in ‘Healthy and hygienic food for kids’ organized by Chanakya Convent School, Jhalawar, Raj. from 14 May 2023 as a source person.
3. Delivered a lecture on the topic “Sustainable lignin nanogel: Advanced UV protective and antimicrobial material for biomedical PDT applications” in ‘Women’s health awareness camp’ organized by ‘Snchi Sakhi Women Empowered Society’, Jhalawar, Raj. from 13<sup>th</sup> August. 2025 as a source person.
4. Delivered a lecture on the topic “Biodegradable lignin photonanosensitizers: A device derived from agri-biomass for antimicrobial photodynamic therapy” in ‘Healthy and hygienic food for kids’ organized by Chanakya Convent School, Jhalawar, Raj. from 12 July 2025 as a source person.

### FDPs/Webinars/Workshops/conferences/Festivals attended

- Participated in Industry-Academia Bio-energy Innovation Conclave (IABIC) organized by SSS-NIBE, Kapurthala, Jalandhar, Punjab, India at 2025.
- Attended the India International Science Festival (IISF), at Panchkula, Haryana, India, 6-9 Dec. 2025.
- Participated and volunteered in 10 days **Faculty Development Program** under DBT Biofoundary-Agri-Food BioMug ‘Elevate Innovate: Advance Research and

Biomanufacturing Skill Development Program' 10-20 June 2025 organized by BRICNABI, Mohali in collaboration with Punjab State Council for Science and Technology (PSCST), Punjab Govt. and the DBT.

- Participated in 5 Day **Faculty Development Program** on "Innovations, IPR and Translational Development in Pharmaceutical and Life Sciences" ITDPL-2025 organized by Amity School of Pharmaceutical Sciences, Amity University Punjab, in Collaboration with Punjab State Council for Science and Technology (PSCST) Punjab on 25-29 August 2025.
- Participated in the International e-Conference on "Cosmeceuticals and Nutraceuticals: Challenges and Opportunities" by the Association of Pharmaceutical Teachers of India (APTI) & APTI Women's Forum held on 12th–13th September 2025.
- Attended Eco-Prabah at BRIC- NABI, Mohali.
- Attended Bio-Pharma Conclave held at IISER Mohali on 13 September 2025.
- Attended RSC Meet the Editors – NIPER Mohali, 21 Nov. 2025.
- NITI Aayog workshop on promoting University-Industry-Government for Technological Advancement of States at BRIC NABI, Mohali, Punjab, India
- Attended ACS science talk on 7<sup>th</sup> March 2024
- Attended ACS science talk on 20<sup>th</sup> September 2023
- Bhaumik, J. Paul, S, Kaur, S., Chandna, **S. Kirar**, S. and Reddy, Y. N. American Chemical Society Meeting Fall 2022, Engineering agro-biomass based lignin derived coating materials as effective renewables, Chicago, IL, USA, August 21-25, 2022
- Attended workshop on online training programme on BSL-3 laboratory training and handling practices for *Mycobacterium tuberculosis* Biosafety level III facility, Department of Biochemistry, University of Delhi South Campus, New Delhi, 19th - 25th July 2021
- Attended an international virtual conference on “**Drug Discovery and Delivery**” organized by the Department of Pharmacy, BITS Pilani, during 6-7 Nov. 2020
- Attended ACS on campus India virtual event on 10<sup>th</sup> Aug 2020
- Attended webinar on “Medical health care: BCG, a century old vaccine against CoVID19: Science and sense and microbial enzymes in healthcare” organized by Biomics on 29<sup>th</sup> Aug. 2020
- Attended webinar on “Career opportunities in pharma and clinical data management sectors” organized by FABA, Hyderabad, on 2<sup>nd</sup> Sept. 2020
- Attended webinar on “Molecular engineering: Tissue engineering and organ printing and nucleotide excision repair in *Mycobacterium tuberculosis*” organized by Biomics on 5<sup>th</sup> Sept. 2020
- Attended webinar on “Fundamental skills required for a successful career in life sciences” organized by FABA, Hyderabad, on 16<sup>th</sup> Sept. 2020
- Attended webinar on “Neurobiology: How do neurons work? and Impact of Immune cells on Neurodegeneration” organized by Biomics on 26<sup>th</sup> Sept. 2020
- Attended a webinar on “Science of Scientific Writings” organized by Biomics on 4<sup>th</sup> Oct 2020
- Attended webinar on “Agri-Biotechnology: Progress and Prospects” organized by FABA, Hyderabad, on 7<sup>th</sup> Oct 2020

## Laboratory skills

### • Techniques:

Chemical synthesis: Synthesis of various photosensitizers (porphyrinic and non porphyrinic), formylation and imidazopyridines substitution

Material science: metallic and polymeric nanoparticle synthesis including silver, gold and gelatin nanoparticles, surface functionalization and conjugation.

Formulation development: Biocompatibility studies, encapsulation and loading determination, drug delivery systems, nanotheranostic development, diagnostics development, stability testing, *in vitro* antimicrobial and cytotoxicity testing of formulations.

Analytical and organic Chemistry: Design, synthesis, isolation, purification and characterization of organic molecules, analysis of the spectrographic data, skilled in HPLC, column chromatography, physicochemical parameter studies.

- Instruments handled

Materials characterization: Dynamic light scattering (DLS), Scanning electron microscopy (SEM), Transmission electron microscopy, Confocal laser scanning microscopy (CLSM), UV-vis spectroscopy, Ultracentrifuge, Lyophilizer, FTIR etc.

Other analytical instruments: Fluorescence spectroscopy, <sup>1</sup>H-NMR, <sup>13</sup>C-NMR, FTIR, GC-MS, Expert in handling of gel electrophoresis

### Others:

- Worked with industrial projects such as IOCL, SSCL, Hauch Ecovation Pvt. Ltd, Ecolastic Pvt. Ltd, etc.
- Capable of both collaborative and independent research
- Experienced in training juniors (M. Tech, Project fellow, Project associate, summer trainee and Junior Ph.D. students)

## References 1. Dr. U. C. Banerjee, Ph. D., MIE

### 2. Dr. J. K. Laha, Ph. D. Professor and Head

Dept. of Pharmaceutical Technology (Process Chemistry)

National Institute of Pharmaceutical Education and Research (NIPER),

Sector – 67, S.A.S. Nagar, Mohali– 160062, Punjab, India Email:

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### 3. Dr. Jayeeta Bhaumik, Ph. D.

Scientist-E

Department of Nanomaterials and Application  
Technology BRIC-NABI, Mohali

Formerly-Center of Innovative and Applied Bioprocessing  
(CIAB) Sector-81 (Knowledge City), S.A.S. Nagar 140306,

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