# BIODATA

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| Academic credentials | • **Postdoc**-DBT Research Associate (2023-2024), Institute of Nano Science and Technology (INST), Mohali, Punjab. Supported by **Department of Biotechnology**, (DBT), India<br>• **Postdoc**-Research Associate (2022-2023) Institute of Nano Science and Technology (INST), Mohali, Punjab, India.<br>• **PhD** – Chemistry (2022); Department of Chemistry, North Eastern Hill University (NEHU), Shillong, Meghalaya, India.<br>• **Master of Science** (2015) - Chemistry (specialization in physical chemistry), Department of Chemistry, Manipur University, India<br>• **Bachelor of Science** (2010) – Chemistry (Honours), Dhanamanjuri College of Science, Manipur University, India.<br>• **HSE** (2007)-Council of Higher Secondary Education, Manipur (COHSEM), India. |
| PhD Thesis | ***Development of functionalized nanoparticles and their application in exploring bio-molecular milieu*** |
| Research Interest | Biophysical Chemistry, Nano biotechnology, Chemical biology |
| Research experience and skill | **Biophysical research experience:** Protein-ligand interactions and utilization of molecular docking techniques to elucidate binding mechanisms. A significant portion of my work has been devoted to preventing protein fibrillation, a key factor in various neurodegenerative diseases. Creation and characterization of in-vitro glycated albumin, providing insights into the biochemical modifications of proteins.<br>**Biological experiments:** Animal cell culture techniques, particularly in glioma and neuroblastoma cell lines (SHSY5Y, C6, and L929 etc.). Performing cytotoxicity and biocompatibility assays, investigating cellular uptake of nanoparticles using microscopy, and targeting specific organelles. Additionally, I have conducted studies on antibacterial activity and anti-amyloid activity, contributing to the development of therapeutic strategies.<br>**Material Chemistry**: Synthesis of nanomaterials, including metal nanoparticles (gold and silver), selenium nanoparticles (Se), magnetic nanoparticles (Fe3O4), and metal oxide and metal sulphide nanoparticles (e.g., ZnO and CdS). Synthesis of graphene oxide (GO) and its applications. |

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| | **Peptide Chemistry**: Peptide synthesis and self-assembly, preparation of amino acid vesicles, facilitated peptide self-assembly, and created bio-mimicking fibrils. |
| Short-term course | Completed post graduate certificate course in Aroma technology at FFDC, Kannauj, Uttar Pradesh 2015-2016 |
| Paper published | (i) P. Kadian, A. Kesari, **I.R. Singh**, Anup, J.J Panda, J. Randhawa, Integrating Surface-Tailored Theranostic Platforms in Core-Shell Architectures to Improve Cancer Intervention Effectiveness, Langmuir (2024) (communicated). (**I.F = 3.9)**<br><br>(ii) **I.R. Singh**, N. Aggarwal, S. Srivastava, J.J. Panda, J. Mishra, Small peptide-based nano delivery systems for cancer therapy and diagnosis, J Pharmacol Exp Ther. (2023). https://doi.org/10.1124/jpet.123.001845. **(I.F = 4.4)**<br><br>(iii) A. Kour, H.S. Panda, **I.R. Singh**, A. Kumar, J.J. Panda, Peptide-metal nanohybrids (PMN): Promising entities for combating neurological maladies, Advances in Colloid and Interface Science. 318 (2023) 102954. https://doi.org/10.1016/j.cis.2023.102954. **(I.F = 12.98)**<br><br>(iv) P.T. Phanrang, **I. R Singh**, J. Upadhyaya, A.K. Chandra, S. Mitra, Molecular Insights on the Modulated Acetylcholinesterase Inhibition Activity of Tacrine Adsorbed on Biocompatible Graphene Oxide, ChemistrySelect. 8 (2023) e202301247. https://doi.org/10.1002/slct.202301247. **(I.F = 2.3)**<br><br>(v) D. Ray, **I. R. Singh,** , A .Bhatta, A. Das, S. Chakrabarty, & S. Mitra, (2022). Modulation of drug binding ability and augmented enzymatic activity of lysozyme stabilized in presence of surface-active ionic liquids. *Journal of Molecular Liquids*, 367 (2022) 120356. **(I.F = 6).** https://doi.org/10.1016/j.molliq.2022.120356<br><br>(vi) **I.R. Singh**, U. Chettri, P Maity, A. K. Ghosh, S. R. Joshi, and S. Mitra, Modulated antimicrobial activity and drug-protein interaction ability of zinc oxide and cadmium sulfide nanoparticles: Effect of doping with few first-row transition metals, Journal of Cluster Science 34 (2023) 799-811. DOI :https://doi.org/10.1007/s10876-022-02257-y. **(I.F = 3.0)**<br><br>(vii) **I.R. Singh**, S.O. Yesylevskyy, S. Mitra, Dietary polyphenols inhibit plasma protein arabinosylation: Biomolecular interaction of genistein and ellagic acid with serum albumins, Biophysical Chemistry, 277 (2021) 106651.DOI:https://doi.org/10.1016/j.bpc.2021.106651.**(I.F=3.8)**<br><br>(viii) P. Baruah, **I.R Singh**, S. Mitra, Multi-spectroscopic investigation on the contradictory relevance of metal nanoparticles in pharmacological milieu in protein glycation and cholinergic inhibition,NEHU journal, XVII, No.1 (2020) 82-98<br><br>(ix) **I.R. Singh**, S. Mitra, Modulated Protein Binding Ability of Anti-Diabetic Drugs in Presence of Monodispersed Gold Nanoparticles and its Inhibitory Potential towards Advanced Glycated End (AGE) Product Formation, Journal of Fluorescence, 30 (2020) 193-204.DOI:10.1007/s10895-019-02485-y. **(I.F=2.7)** |

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| | (x) **I.R. Singh**, S. Mitra, Interaction of chlorpropamide with serum albumin: Effect on advanced glycated end (AGE) product fluorescence, Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, 206 (2019) 569-577.DOI:https://doi.org/10.1016/j.saa.2018.08.055. **(I.F=4.0)**<br><br>(xi) V.K. Sonu, **I.R. Singh**, S. Mitra, Interaction of caffeine and sulfadiazine with lysozyme adsorbed at colloidal metal nanoparticle interface: influence on drug transport ability and antibacterial activity, Journal of Biomolecular Structure and Dynamics,37 (2019) 321–335. https://doi.org/10.1080/07391102.2018.1426497. **(I.F=4.4)** |
| Book chapter published | (i) S. Moyon, **I.R Singh**, V.K. Sonu, P.Baruah, M.A. Rohman, S. Mitra Application of luminol as solvatocromic probe and fluorescent biomarker for heterogenous media, 54, 177-245 (2019) Advances in Chemistry Research 54, 177-245 (2019) |
| Invited talks | (i) Delivered a flash invited talk on the topic "Interaction of anti-diabetic drugs with native and glycated serum albumins" at ERCS, April, 2022, Department of Chemistry, Dhanamanjuri University, Imphal |
| Conference and symposium | (i) Participated in the National Symposium on Recent Trends in Chemistry (RTC-2019) held on Department of chemistry, NEHU<br>(ii) Presented a poster on the "Effect of gold nanoparticles on serum albumin and formation of AGE's product" on Recent Advances in Chemistry (RAC 2019) held at NIT, Shillong<br>(iii) Delivered an oral presentation on the topic "*Gold and silver nanoparticle alters the drug binding capacity of lysozyme*" on National seminar cum workshop in Nanoscience (NSWN-2018) held at Department of Nanotechnology, NEHU, Shillong<br>(iv) Attended the national seminar on " Contemporary challenges in chemistry" (NSC-2018) held on Department of Chemistry, NEHU, Shillong<br>(v) Presented a poster on "*Modulatory effect of colloidal nanoparticles on lysozyme-drug interaction*" at Trombay Symposium on Radiation and Photochemistry (TSRP-2018)<br>(vi) Attended National Science Camp for Higher Secondary students as a representative teacher at Mizoram University on November 2013 |
| Cultural and sports activities | (i) Participated under 17 boys and girls chess championship held at Kerala from 4$^{th}$ to 10$^{th}$ January 2007<br>(ii) Participated under 19 boys chess championship held at Aurangabad from 22$^{th}$ to 24$^{th}$ September 2007<br>(iii) Participated in NEHU fit India Volleyball Tournament 2021 |
| Social activities | • Regular participant of different courses conducted by The art of living foundation<br>• Completed youth leadership training programed (YLTP) conducted by the The art of living foundation |