DR. MOUSUMI KUNDU

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Qualified Patent Agent Examintion 2025 (Registration Under Process)

Professional Summary and Core competencies:

- Detail-oriented and analytical Intellectual Property (IP) professional with comprehensive knowledge of the Indian Patents Act, 1970, and Designs Act, 2000.
- Capable of drafting and filling patent and design applications with the Indian Patent Office in compliance with national laws and procedural requirements.
- Skilled in patent specification and claim drafting, prior art searching, and analysis.
- Proficient in using advanced IP tools including PatSeer, Patsnap, LexisNexis TotalPatent One, Orbit, PatentScope, PubChem, and Espacenet.
- Adept at translating complex scientific and technical information into clear, enforceable IP protection strategies.
- Competent to assess patentability and to provide FTO opinions for product launches and R&D projects.
- Committed to delivering strategic patent insights and protecting innovative ideas.

Academic Qualifications:

- **Ph.D**.: Chemistry 2023
  University of Calcutta

Bose Institute, Kolkata

Thesis Title: "***Synthesis of multifunctional nanoparticles for stimuli responsive and targeted drug delivery***"

- **M.Sc.:** Chemistry 2015 (70.55%)
  IIEST, Shibpur, West Bengal
- **B.Sc.:** Chemistry 2013 (64.75%)
  Burdwan University, West Bengal
- **Higher Secondary:** Science 2010 (86.00%)
  West Bengal Council of Higher Secondary Education
- **Secondary** 2008 (89.63%)
  West Bengal Board of Secondary Education

Research Summary

- *The research project was focused on the formulation and characterizations of different nanosystems for drug delivery. The anticancer efficacy through the nanocarriers was analyzed of two natural antioxidants like curcumin and umbelliferone and one synthetic compound like 1j [3, 3' -((4- (trifluoromethyl) phenyl)methylene)bis(2-hydroxynaphthalene-1,4- dione)].*
- *These drug molecules (above mentioned) were loaded into inorganic nanoparticles (Zinc Oxide nanoparticles: ZnO NPs and mesoporous Silica nnaoparticles: MSN NPs) containing stimuli sensitive segments (Poly acrylic acid: PAA, Gold nanoparticles: GN) to achieve controlled drug release in cancer cells.*
- *Nanoparticles were fabricated with targeting ligands (like PBA, FA) to increase the cellular uptake for enhanced anticancer efficacy.*

- *Detail anticancer efficacy along with systemic toxicity both in vitro and in vivo of the formulated nanoconjugates was evaluated.*

Technical knowledge acquired:

Chemical techniques:

Proficiency with Liquid & Gas Chromatography (thin layer, column, HPLC), GC/MS, BET Surface Area Analysis, TEM, SEM, Powder X-Ray Diffraction, UV/Vis Spectroscopy, fluorescence spectroscopy, Energy Dispersive X-Ray Analysis (EDX), dynamic light scattering experiment, zeta potential or surface potential measurement, NMR and FTIR analysis.

Biochemical techniques:

Western blot, assay of different enzymes (spectrophotometric and fluorometric), preparation of histopathological slides, quantification of protein, DPPH assay, FRAP assay, ROS measurement using DHE staining.

Animal experiments:

Experience in handling animals (mice, rat) and isolation of different organs, *in vivo* anticancer activity study.

Cell Biology techniques:

Cell culture, handling of cancer cell lines, immunofluorescence (IF), immunohistochemistry (IHC), reactive oxygen species (ROS) and mitochondrial membrane potential (MMP) determination using fluorescent dyes with the help of FACS, protein extraction from various organs, western blotting, subcellular fractionation from tissues [isolation of nuclear, mitochondrial, isolation of RNA, PCR, real time PCR, isolation of DNA, mode of cell death determination by DNA fragmentation assay and TUNEL assay,.

Microbiology:

Liquid and solid culture of bacteria, growth inhibition study.

Other techniques learned during BSc and MSc courses:

Detection of special element and functional groups, preparation and purification of derivatives, separation and identifications of two component mixtures of organic compounds, synthesis and isolation of organic compounds using different techniques (air sensitive/ moisture sensitive etc.), separation/ purification (extraction, soxhlet extraction, recrystallization, distillation, column chromatography), monitoring of reaction by TLC, structure determination of the isolated pure compounds using NMR/IR spectroscopy and Mass spectrometry, qualitative semi micro analysis of mixtures containing acid/basic radicals, quantitative analysis of metal ions, gravimetric analysis, determination of rate constant, kinetic study, partition coefficient, solubility product etc.

List of publications:

[1] **M. Kundu**, P. Sadhukhan, N. Ghosh, S. Chatterjee, P. Manna, J. Das, P.C. Sil, pH-responsive and targeted delivery of curcumin via phenylboronic acid-functionalized ZnO nanoparticles for breast cancer therapy, **Journal of advanced research** *18* (2019) 161-172.

[2] **M. Kundu**, S. Chatterjee, N. Ghosh, P. Manna, J. Das, P.C. Sil, Tumor targeted delivery of umbelliferone via a smart mesoporous silica nanoparticles controlled-release drug delivery system for increased anticancer efficiency, **Materials science and engineering: c** *116* (2020) 111239.

[3] **M. Kundu**, P. Sadhukhan, N. Ghosh, S. Chatterjee, P. Manna, J. Das, P.C. Sil, Design of redox-responsive smart gold nanoparticle gated multifunctional mesoporous silica nanoparticle based drug delivery platform for targeted tumor therap , **Materials science and engineering: c** *126* (2021) 112142.

[4] P. Sadhukhan, **M. Kundu**, [**contributed equally**] S. Rana, R. Kumar, J. Das, P.C. Sil, Microwave induced synthesis of ZnO nanorods and their efficacy as a drug carrier with profound anticancer and antibacterial properties, **Toxicology reports** 6 (2019) 176-185.

[5] P. Sadhukhan, **M. Kundu**, S. Chatterjee, N. Ghosh, P. Manna, J. Das, P.C. Sil, Targeted delivery of quercetin via pH-responsive zinc oxide nanoparticles for breast cancer therapy, **Materials science & engineering: c** 100 (2019) 129–140.

[6] D. Biswal, N.R. Pramanik, M.G. Drew, N. Jangra, M.R. Maurya, **M. Kundu**, P.C. Sil, S.

Chakrabarti, Synthesis, crystal structure, DFT calculations, protein interaction, anticancer potential and bromoperoxidase mimicking activity of oxidoalkoxidovanadium (V) complexes**, New journal of chemistry** 43(45) (2019)17783-17800.

[7] M. Roy, D. Biswal, O. Sarkar, N.R. Pramanik, M.G. Drew, P. Sadhukhan, **M. Kundu**, P.C. Sil, S. Chakrabarti, New mononuclear and binuclear oxomolybdenum (V) complexes containing NN chelator: Syntheses, DFT calculations, interaction with BSA protein and in vitro cytotoxic activity, **Journal of inorganic biochemistry** 199 (2019) 110755.

[8] S. Ghosh, S. Dutta, A. Sarkar, **M. Kundu**, P.C. Sil, Targeted delivery of Curcumin in breast cancer cells via Hyaluronic acid modified Mesoporous Silica Nanoparticle to enhance anticancer efficiency, **Colloids and Surfaces B: Biointerfaces** 197 (2020) 111404.

[9] N. Tejwan, **M. Kundu**, N.Ghosh, S.Chatterjee, A. Sharma, T.A. Singh, J. Das, P.C. Sil, Synthesis of green carbon dots as bioimaging agent and drug delivery system for enhanced antioxidant and antibacterial efficacy, **Inorganic Chemistry Communications** 139 (2022) 109317.

[10] S. Ghosh, **M. Kundu**, S. Dutta, S. Mahalanobish, N. Ghosh, J. Das, P.C. Sil, Enhancement of anti-neoplastic effects of cuminaldehyde against breast cancer via mesoporous silica nanoparticle based targeted drug delivery system, **Life Sciences** 298 (2022) 120525.

[11] A. Sharma, **M. Kundu**, N.Ghosh, S.Chatterjee, N. Tejwan, T.A. Singh, J. Das, P.C. Sil, Synthesis of carbon dots from taurine as bioimaging agent and nanohybrid with ceria for antioxidant and antibacterial applications, **Photodiagnosis and Photodynamic Therapy** (2022) 102861.

[12] S. Mahalanobish, **M. Kundu** [**contributed equally**], S. Ghosh, J. Das, P.C. Sil, Fabrication of phenyl boronic acid modified pH-responsive zinc oxide nanoparticles as targeted delivery of chrysin for lung cancer therapy, **Toxicology reports** 9 (2022) 961-969.

[13] T.A. Singh, **M. Kundu**, S.Chatterjee, S. K. Pandey, N. Thakur, N. Tejwan, A. Sharma, J. Das, P.C. Sil, Synthesis of Rutin loaded nanomagnesia as a smart nanoformulation with

significant antibacterial and antioxidant properties, **Inorganic Chemistry Communications** 140 (2022) 109492.

[14] P. Sarkar, P. Basak, S. Ghosh, **M. Kundu**, P.C. Sil, Prophylactic role of taurine and its derivatives against diabetes mellitus and its related complications, **Food and chemical toxicology** 110 (2017) 109-121. [Review]

Book Chapter

[1] S. Sarkar, N.Ghosh, **M.Kundu**, P.C. Sil, Nrf2 and Inflammation-Triggered Carcinogenesis, chapter in the book entitled, "Nrf2 and its Modulation in Inflammation" Publisher: Springer, Nature Switzerland AG (2020).

[2] N.Ghosh, S.Chatterjee, **M.Kundu**, P.C. Sil, Oxidative Stress-Dependent Anticancer Potentiality of Nanotherapeutic Zinc Oxide. In *Handbook of Oxidative Stress in Cancer: Therapeutic Aspects* (pp. 1-22). Singapore: Springer Singapore (2022).

Teaching Experience

Bankura Zilla Saradamani Mahila Mahavidyapith as guest lecturer for 6 months (2016).

Work Experience

Forensic Science Laboratory, Govt of West Bengal as contractual employee for 6 months.

Conferences/Workshops Attended:

1. 3rd International Conference on Perspectives of Cell Signalling and Molecular Medicine at Bose Institute, Kolkata 8-10 January 2017.
2. First International Conference on Technologies for Smart Green Connected Society (ICTSGS-1), 29-30 Nov, 2021, Online| Worldwide : Oral Presentation.

Awards:

2010-2015	Awarded Inspire Fellowship (Govt. of India).
2012	Qualified: Certificate of participation for the Concept Test in Chemistry conducted by Association of Chemistry Teachers (ACT)
2014	Qualified: CSIR-UGC NET examination for lectureship (Govt. of India).
2015	Qualified: GATE Exam
2016-2021	Awarded UGC-CSIR NET Fellowship by University Grants Commission, Government of India.