Cover Letter

August 2025

Respected Professor,

Greetings!

I am Dr. Mallikarjuna Reddy Kesama, currently working as a Postdoctoral Research Associate at Purdue University, USA. I am writing to express my interest in joining your esteemed institution as a Postdoctoral Researcher, or in a company as a Scientist. With extensive research experience in biopolymers, nanomaterial composites, DNA nanotechnology, and device engineering, I bring a multidisciplinary background that bridges materials science, nanotechnology, and bioelectronics.

My research has focused on the development of **nanomaterials-embedded DNA biopolymer complexes**, with a deep understanding of their physical interactions, confirmed through comprehensive characterizations, structural (SEM, and AFM), optical (UV-Vis, FTIR, Raman, CD, ellipsometry, XRD, XPS), electrical (probe station & CV), magnetic (SQUID, VSM), mechanical (nanoindentation), and thermal (TGA, DSC, DTA). My Ph.D. work, titled *"Characterization of Multifunctional Nanomaterials Embedded DNA Thin Films for Usage in Nanotechnology,"* laid the foundation for this expertise.

I have hands-on experience in synthesizing nanomaterials using one-pot chemical reduction and hydrothermal methods and developing biopolymer-based structures in various forms; solutions, powders, films, foams, fibers, and porous composites. I've employed multiple fabrication techniques, such as solvent evaporation (drop-casting, spin-coating), electrospinning, freeze drying, doctor-blading, shearing, and molding for contact lens fabrication. These materials have been implemented in **photodetectors, capacitors, triboelectric nanogenerators, supercapacitors**, and are also being extended to **BioLEDs, memory devices, solar cells**, and **wearable electronics**.

Across my postdoctoral journey, I have contributed to four major research areas:

1. **Institute of Basic Sciences (IBS) & Institute of Quantum Biophysics (IQB), Sungkyunkwan University, South Korea**: Investigated electrical and physical behavior of amyloid-beta (Aβ) proteins responsible for neurodegenerative diseases (e.g., Alzheimer's and Parkinson's), using near-field THz measurements and electrochemical biosensing.

2. **Ajou University, South Korea**: Synthesized silk fibroin and DNA-protein composites for applications in broadband photodetectors, contact lenses, triboelectric devices, and drug delivery.
3. **Department of Physics, Sungkyunkwan University, South Korea**: Developed flexible, self-supporting thin films using biopolymer–nanomaterial composites for rollable energy storage and harvesting devices.
4. **Purdue University, USA**: Currently focusing on synthetic vesicles and DNA origami for drug delivery and nano-device construction, as part of synthetic cell-mimicking systems for studying complex biological responses. mRNA-DNA Origami tile transfection and translation, RCA in giant vesicles, proteolysis in vesicles, and Hydrogel for random walk.

Prior to my academic career, I worked as a **Senior Technical Officer** at *Hind High Vacuum Company Pvt. Ltd.*, India, where I was deeply involved in vacuum and thin film coater design, testing, and R&D system optimization, providing me with a strong foundation in applied engineering.

To date, I have published **18 peer-reviewed SCI journal articles**, with a **total impact factor of 104.3** (average IF: 5.8), over **309 Google Scholar citations**, and **h-index of 10 (i10-index: 10)**. My work has been featured in reputed journals such as *ACS Nano, Advanced Science, ACS Applied Materials & Interfaces, ACS Catalysis, Nanotechnology, Scientific Reports, Materials Chemistry & Physics,* and *Colloids and Surfaces B: Biointerfaces*.

I am confident that my multidisciplinary training, international research collaborations, strong publication record, and experience in both academia and industry position me well to make meaningful contributions to your department. I am particularly excited about the opportunity to lead independent research, mentor students, and develop collaborative, cutting-edge research programs in biopolymer-based nanodevices and functional materials.

Please find my CV and supporting documents attached. I would be honored to be considered for a **postdoctoral research position** and look forward to the opportunity to contribute to your lab and institutions.

Thank you for your time and kind consideration.

Sincerely,

Dr. Mallikarjuna Reddy Kesama, Postdoctoral Research Associate

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