

## **SHEEBA SONALI**

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Email – sheebasonali6@gmail.com

Contact no. -7377159693

Location: Kharagpur, West Bengal

LinkedIn- [www.linkedin.com/in/sheeba-sonali-3a81b5171](http://www.linkedin.com/in/sheeba-sonali-3a81b5171)

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### **Professional Summary**

Experienced researcher with 7+ years in polymer synthesis, tissue engineering, drug delivery systems, 2D thin films, magnetic materials for spintronics, and high-temperature-resistant nanocomposite superhard coatings. Currently pursuing PhD in IIT Kharagpur's Biomaterials and Tissue Engineering (BMTE) group, Department of Medical Science and Technology, specializing in "Application of Reactive Oxygen Species in Biomaterials and Healthcare". Eager to leverage interdisciplinary fabrication and characterization expertise in senior research roles, advancing biomaterial fabrication for tissue engineering.

### **Skills**

#### **Fabrication & Synthesis**

- DC/RF sputtering for single/multi-layer nitride coatings and nanocomposites; 3D printing, hydrothermal, sonochemical, reverse micelle, combustion, and solid-state methods for nanoparticles, ceramics, and polymer scaffolds, sample polishing/grinding, hydraulic press, Chemical crosslinking, Photo crosslinking

#### **Mechanical & Surface Characterization**

- Nanoindentation for hardness, modulus, and 3D topography via in-situ SPM; stylus profilometry for thickness/roughness; pencil hardness testing for adhesion.

#### **Optical & Structural Analysis**

- UV-Vis spectroscopy for thin films/powders; Origin-based calculations of crystallite size, refractive index, extinction/absorption coefficients, and band gap; XRD/GIXRD, Raman Spectroscopy, FTIR, XPS, FESEM/TEM-EDX, TGA, NMR, PLS.

#### **Biological Assays**

- Cell viability, antibacterial activity, and isolation of corneal fibroblasts/epithelial cells, biocompatibility evaluation.

#### **Computational Tools**

- Data analysis/modeling with ImageJ, OriginPro, GraphPad Prism; programming in MATLAB, C, FORTRAN 77.

### **Professional Experience**

#### **PhD Researcher, Biomaterials and Tissue Engineering (BMTE) Group**

Department of Nano Science and Technology, IIT Kharagpur | Jan 2022 – Present

- Investigating applications of reactive oxygen species (ROS) in biomaterials and healthcare,
- Developing nanocomposite-loaded biodegradable scaffolds for bone regeneration

### **Junior Research Fellow, SERB Funded Project**

IIT Hyderabad | Mar 2021 – Jan 2022

- Engineered ferromagnetic/antiferromagnetic (FM/AFM) layers via DC/RF sputtering to enable resistive switching and electric field-controlled exchange bias for spintronic devices.

### **Machine Learning Certification**

- Lema Labs, IIT Madras | (13 weeks) (June 2021 – September 2021)

### **Junior Research Fellow (P-JRF), DST-SERB Funded Project**

CSIR-Institute of Minerals and Materials Technology, Bhubaneswar | Jun 2019 – Nov 2020

- Fabricated 2D multilayer and ternary composite thin films using DC/RF sputtering, achieving high-temperature resistance, transparency, and superhard properties.

**M.Sc Final Year Project:** "Synthesis of nano ZnO and its characterisation: Modified Auto Combustion Route"

C.V. Raman College of Engineering, Bhubaneswar | 2018

**Summer Internship Project:** "Study of  $\alpha$ -particle spectroscopy using Si-Surface Barrier Detector"

Variable Energy Cyclotron Centre, Kolkata | 2017

## **Education**

### **M. Sc in Applied Physics**

C.V. Raman College of Engineering, Bhubaneswar | 2018 | CGPA - 9.45

### **B.Sc in Physics**

College of Basic Science and Humanities,OUAT, Bhubaneswar | 2016

## **Examination and Fellowship**

- Qualified Graduate Aptitude Test in Engineering (GATE)- 2019 in Physics

## **Publication**

- **Sonali, S.,** Jena, I., & Rout, S. K. (2020). A comparative study of synthesis of ZnO nano particles: Hydrothermal and modified combustion routes. *Materials Today: Proceedings*, 33, 4966-4970.
- Anwar, S., **Sonali, S.,** & Anwar, S. (2023). Microscopic studies on transparent AlSiN ternary hard coating. *Ceramics International*, 49(11), 16868-16878.
- **Sonali, S.,** Dhara, S., Rana, S. (2026). Tailoring Size Distribution and Morphology by Exploring ZnO Nanoparticle Synthesis Methods Toward Cell Viability With Improved Antibacterial Efficacy. *ChemistrySelect*

## **Conferences and Workshops**

### **Presented**

- Oral Presentation: A comparative study of synthesis of ZnO nano particles: Hydrothermal and

modified combustion routes, 2<sup>nd</sup> International Conference on Processing and Characterization of Materials-2019

- Poster Presentation: Development of AlSiN anti-scratch transparent coating, National Seminar on Role of Physics in Technological Advances & 37<sup>th</sup> Convention of Orissa Physical Society (2020)
- Poster presentation: Development of CrAlN nanocomposite coating for biomedical applications, International Conference on Global Challenges in Nanomaterials Research for Environmental and Healthcare Applications-2020
- Oral presentation: Synthesis of cerium oxide nanoparticles by sonication-assisted method for free radical scavenging activity for healthcare applications, International Symposium on Sustainable Technologies – The Way Forward-2025

### **Attended**

- Conference of Optics and Photonics Technology- 2016
- 2<sup>nd</sup> International Conference on Processing and Characterization of Materials-2019
- National Seminar on Role of Physics in Technological Advances & 37<sup>th</sup> Convention of Orissa Physical Society (2020)
- International Webinar on Frontiers in Materials for Technological Applications-2020
- International Conference on Global Challenges in Nanomaterials Research for Environmental and Healthcare Applications-2020
- Online Workshop on Rietveld Refinement Method organized by UGC-DAE Consortium for Scientific Research (2020)
- AICTE Training and Learning Academy Online FDP on Photonics-2020
- International Virtual Conference on Advances in Functional Materials-2020
- Preconference workshop on "Advances in 3D Printing and Bioprinting" and "Publishing, Scientific Writing and Communication", BIO Remedi-2022
- International Conference on "Recent Advances in Medical Science and Technology" (RAdMed-2025)

### **Declaration**

I hereby declare that all the above statements are true and correct to the best of my knowledge and belief.

Place: Kharagpur

Date: 23.02.2026

Sheeba Sonali