



Dr. Mokurala Krishnaiah

Marie Curie Post-Doctoral Researcher at Hybrid Solar Cells Lab, Faculty of Natural Science and Engineering, Tampere University, Tampere, Finland, **Mentor: Prof. Paola Vivo**

Profile Summary

Materials Scientist and Device Engineer with international R&D experience across India, South Korea, the USA, and Finland. Expert in indoor and outdoor photovoltaics, photodetectors, memristors, flexible optoelectronics, neuromorphic devices, and supercapacitors. His work integrates AI-driven materials discovery and device optimization for next-generation energy and sensing technologies. Skilled in nanomaterial synthesis, thin-film deposition, cleanroom microfabrication, and solution processing of carbon nanotubes (CNTs). He also has extensive experience in advanced material characterization and device engineering for optoelectronic and energy applications.

Professional Experience and Technical Skills

29/01/2024 – Present : Marie Curie Post-Doctoral Researcher at Hybrid Solar Cells Lab, Faculty of Natural Science and Engineering, Tampere University, Tampere, Finland, **Mentor: Prof. Paola Vivo**

Title of project: Self-Powered Near-Infrared Photodetectors for Wearable Healthcare Devices and Development of lead-free perovskites for outdoor and indoor photovoltaics

01/09/2022 – 19/01/2024: Research Professor at Nano Fab, Incheon National University (INU), **Department of Electronics Engineering,** South Korea

Title of project: Cleanroom-Based Microfabrication and Thin Film Processing for High-Performance photodetector and Memristor arrays for neuromorphic computing and data storage.

- **Cleanroom-Based Microfabrication:** Thin-film processing and patterning for high-performance optoelectronic devices using lithography, etching, and passivation.

- **Vacuum-Based Thin Film Deposition:** Deposition of oxide thin films and metal electrodes using RF/DC sputtering, atomic layer deposition (ALD), thermal and e-beam evaporation, and chemical vapor deposition (CVD).

- Fabrication and Characterization of RRAMs Based on Metal Oxides, Metal Halides, and Lead-Free Perovskite Materials

01/04/2018 – 31/08/2022: Post-doctoral Researcher, INU, Department of Electronics Engineering, South Korea, **Mentor : Prof. Sung Hun Jin**

Sustainable Nanomaterials: Synthesis and characterization of chalcogenides, oxides, metals, chalcogenides, hybrid nanomaterials (e.g., chalcogenides/CNTs), and lead-free halide perovskite nanoparticles using wet chemical processes such as **solid-state reaction**, hydrothermal, solvothermal, and hot injection.

Carbon Nanotubes: Solution-based CNT coatings using dip, spray, and spin techniques.

Direct Solution Growth of Functional Thin Films: Fabrication of oxides (ZnO, TiO₂), chalcogenides, lead-free halide perovskite nanoparticles, and chalcogenides via dip and spin coating techniques.

Advanced Characterization Techniques: Experience with XRD, Raman, TEM, SEM, EDS, FTIR, TGA, BET, rheology, and XPS, with direct operational expertise in XRD, XPS, Raman, and SEM.

Electrical Characterization of Optoelectronic Devices: Proficient in electrochemical techniques (cyclic voltammetry and impedance spectroscopy) and electrical testing of memristors, solar cells, photodetectors, supercapacitors, and physical sensors.

Programming skills: C, C++, Python, MATLAB, AutoCAD, and Fortran.

Pedagogical strategies : Teaching and Learning for Higher Education (10 ECTS credits) and Academic Supervision and Guidance (5 ECTS credits)

CONTACT ME

+358504798280/+917842 822017

krishrama33@email.com

Tampere, Finland

<https://scholar.google.co.uk/citations?user=T3T8a-QAAAAJ&hl=en>

Date of Birth: 15/08/1987

Nationality: India

Excellence Award

• Honored with the “**Excellence in Academic Thesis Award**” from the Indian Institute of Technology Bombay, Mumbai, India (2018)

Publication Merits

- International Journals =56
- Conference articles =14
- Two book chapters
- Two patents filed
- H index-22; i1 index-38 ; Citations –1303

Research Awards& Honors

- Awarded the prestigious **MSCA European Postdoctoral** Independent Research Grant (2024)
- Received the National Research Foundation Fellowship (**NRF, 2021**)

- Awarded the SERB National Postdoctoral Fellowship (**N-PDF, 2017**)

- Secured the **SERIIUS-MAGEEP** Scholarship (2015)

- **Visiting Scholar** at National Renewable Energy Laboratory (**NREL**) and Washington D.C university, USA

Mentor activities

- Mentoring activities on various academic research projects for 10 undergraduates) during the Ph.D. program IITB and postgraduate

(6 master's and 4 Ph.D. students as a postdoctoral fellow Incheon National University (INU).

• Co-supervisor of Two PhD students, one postdoc, 2-3 Summer interns at Hybrid Solar Cells at Tampere University (2025-present)

Teaching Experience

- 2024, 2025- **co-lecture** : Co-lecture for a course on solar-driven chemistry (KEM.370-2024-2025-1) at Tampere University
- **2022–2024**: Lecturer, Super INU Education Program, Incheon National University (South Korea): Taught surface characterization techniques for microfabricated optoelectronic devices, with a focus on defect analysis, to undergraduates and industry professionals.

Expertise

in optoelectronics Devices and AI

- RF sputtering of metal oxides and room-temperature iodization of metal halides, along with solution-processed metal halide perovskites, used as resistive switching (RS) layers for RRAM devices.
- Fabrication and characterization of RRAM and memristor devices.
- Development and testing of oxide-based crossbar RRAM arrays.
- Photodetectors, chalcogenide solar cells and supercapacitors.
- Artificial Intelligence (AI) for indoor photovoltaics (IPVs)

References

1. Prof. Parag Bhargava

Department of Metallurgical Engineering & Materials Science, Indian Institute of Technology Bombay, Mumbai, India, Pin Code: 400076
Phone No: +912225767628

E-mail: pbhargava@iitb.ac.in

2. Prof. Sudhanshu Mallick

Department of Metallurgical Engineering & Materials Science Indian Institute of Technology Bombay, Mumbai, India, Pin Code: 400076
Phone No.: +912225767641 E-mail: mallick@iitb.ac.in

3. Prof. Paola Vivo

Hybrid Solar Cells Lab, Faculty of Natural Science and Engineering, Tampere University, Tampere, Email id : paola.vivo@tuni.fi
Contact number: +358443407081

Education

01/01/2012 – 12/08/2017: Research Scholar (**Ph.D. student**), Department of Metallurgical Engineering & Materials Science (MEMS), **Indian Institute of Technology Bombay (IITB)**, Mumbai, India

Supervisors: Prof. Sudhanshu Mallick and Prof. Parag Bhargava

Title of Thesis: “Fabrication of earth-abundant quaternary chalcogenides films for dye-sensitized and thin films solar cells”

12/07/2009 – 30/06/2011: Master of Technology (**M.Tech**), Department of MEMS, Indian Institute of Technology Bombay, Mumbai, India

Supervisors: Prof. Raman S. Srinivasa and Prof. A .R. Kulkarni

Title of thesis: Nanocrystalline ZnO based Varistors

01/07/2007 – 30/06/2009: Master of Science (**M.Sc**), Department of Physics, Osmania university, Hyderabad, Telangana, India

Research Grants

• **Marie Skłodowska-Curie Actions (MSCA)** European Postdoctoral Independent Research Grant (Project No. 101150357-SPINIP-HORIZON-MSCA-2023-PF-01 (June-2024 – May-2026)

• **Principal Investigator (PI)**: National Research Foundation of Korea (**NRF-2021R111A1A01049897**) **independent research grants** for three years (June 2021-Jan-2024)

• **Co-Principal Investigator (Co-PI)**: Developing reversible inversion-doping technology for two-dimensional transition metal chalcogenide photosensitive transistors (**NRF-2020R1A6A1A03041954**) (June 2020-Jan-2023)

• **Principal Investigator (PI)**- SERB-National Post-Doctoral Fellowship (**N-PDF-PDF/2017/002037**) **independent research grants** for two years (2017) from Science and Engineering Research Board, India

• **SERIIUS–MAGEEP Scholarship** (SERIIUS visiting scholar) for collaborating work at **NREL** for six months (June -2015 to December 2015)

Selective articles

1. **Mokurula Krishnaiah**¹, Kuntal Singh², Sanchi Monga³, K. D. M. Rao^{2*}, Paola Vivo^{1*}, et al., “Perovskite-Inspired Cs₂AgBi₂I₈: A Promising Photovoltaic Absorber for Diverse Indoor Environments” *Advanced Energy Materials*:**2025**, **15** **2404547**, <https://doi.org/10.1002/aenm.202404547> (**I.F=27.8**, citations=25),

2. Noora Lamminen, Jussi Lahtinen, **Mokurula Krishnaiah**, Grandhi, G. Krishnamurthy* and Paola Vivo* “Surpassing the 10% Efficiency Threshold in Perovskite-Inspired Indoor Photovoltaics” *ACS Energy Lett.* **2025**, **10**, **3415–3418** , <https://pubs.acs.org/doi/full/10.1021/acsenerylett.5c01472> , (**I.F=18.2**, citations=6),

3. Ajit Kumar¹, **Mokurula Krishnaiah**¹, et al., “Multibit, Lead-free Cs₂SnI₆ Resistive Random-Access Memories with Self-compliance for Improved Accuracy of Binary Neural Network Application” *Advanced Functional Materials* **2024**, **34**, **2310780** (**I.F= 19.0**)

4. Dhananjay Mishra, **Krishnaiah Mokurula**, et al., “Light-Mediated Multi-Level Flexible Copper Iodide Resistive Random Access Memory for Forming-Free, Ultra-Low Power Data Storage Application” *Advanced Functional Materials* **2022**, **2211022**, (**I.F= 19.0**)

5. **Mokurula Krishnaiah**, Seung Gi Seo, Sung Hun Jin, et al “Physically Detachable and Operationally Stable Cs₂SnI₆ Photodetector Arrays Integrated with μ-LEDs for Broadband Flexible Optical System”, *Advanced Materials*: **(2022)**, **34**: 2109673, <https://doi.org/10.1002/adma.202109673> , (**I.F=26.8**, citations=45)

6. **Mokurula Krishnaiah**^{*}, G. Krishnamurthy Grandhia, Paola Vivo* a “**AI-Driven Strategies for Lead-Free Indoor Photovoltaics**: Challenges and Roadmap” 3rd International Conference on Recent Trends in **AI Enabled Technologies** , Dec-2025

7. Teja M. Patil, Aravind H. Patil, **Mokurula Krishnaiah**, Dhananjay Mishra, Sung Hun* Jin, Vibhavari P. Malekar* (2023), “Enhanced electrochemical performance of CuCo₂O₄ nanowire arrays based solid-state symmetric supercapacitor by K₃[Fe(CN)₆] redox additive electrolyte”, *J. Energy Storage*: **63**: **106945**, <https://doi.org/10.1016/j.est.2023.106945>, (**I.F=9.8**, citations=24)

8. **Mokurula Krishnaiah**^{*}, Parag Bhargava, Andriy Zakutayev* (2016), “Combinatorial chemical bath deposition of CdS contacts for chalcogenide photovoltaics,” *ACS. Comb. Sci.*: **18** (9): 583–589 DOI: 10.1021/acscmbosci.6b00074. , (I.F=3.9, citations=26).