Siddharth Maddali, Ph.D

Scientific Consultant

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siddharthmaddali

Experience

Independent — *Fremont, CA, USA*
– **Scientific Consultant** — Feb 2024 – present

KLA Corporation (KLA-Tencor) — *Milpitas, CA, USA*
– **Research Scientist** — Nov 2022 – Jan 2024
  – Developed methods for sensitivity enhancement in semiconductor wafer inspection processes.

Argonne National Laboratory — *Chicago, IL, USA*
– **Staff Scientist** — Oct 2019 – Sep 2022
  1. Led the development and worked on **first demonstration** of the lens-less MR-BCDI imaging technique.
  2. Led design of future experiments at DoE facilities with physics-based signal processing techniques.
  3. Led the multi-scale X-ray imaging approach for materials in difficult-to-access environments (APS, ESRF).
  4. Managed research grants (ANL LDRD) for early-stage projects at synchrotron facilities.
  5. Proposed and executed successful synchrotron experiments (US, France).
  6. Published in high-impact journals, mentorship, organized/chaired international workshops.
– **Postdoctoral researcher** — Jan 2017 – Sep 2019
  1. **First demonstration** of multi-scale, high-energy coherent diffraction imaging (HEDM) of 3D materials.

National Energy Technology Laboratory — *Pittsburgh, PA, USA*
– **Postdoctoral Researcher**: ORISE Fellow — May 2016 – Nov 2016
  1. Developed guidelines for machine learning-driven materials discovery of novel, function-optimized alloys.

Carneige Mellon University — *Pittsburgh, PA, USA*
– **Graduate teaching/research assistant** — Aug 2009 – Feb 2016
  1. Dissertation on mining meso-scale materials physics from high-energy synchrotron data.
  2. Created HierarchicalSmooth: mesh smoothing software for physical interface networks.
  3. Taught mechanics & electromagnetism to undergraduate science majors.

Education

Ph.D, & **M.S.**, Physics (Dissertation area: materials science) — **Pittsburgh, PA, USA**
— *Carnegie Mellon University* — Aug 2009 – Feb 2016

M.Sc, Physics — **Chennai, TN, India**
— *Indian Institute of Technology Madras (IIT-M)* — Aug 2007 – May 2009

B.Sc, Physics, mathematics, electronics — **Bengaluru, KA, India**
— *Bangalore University* — June 2004 – May 2007

Technical skills

– **Science**: Geometric/Fourier optics, microscopy, X-ray science, condensed matter/materials physics, electromagnetics, statistical physics, semiconductors, experimental design, quantum sciences
– **Computation**: Linear algebra, imaging/reconstruction, signal processing, inverse problems, simulations, statistics, probability, FDTD, RCWA, computational geometry, differential equations, machine learning/deep learning/CNNs
– **Programming**: Python scientific stack (numpy, scipy, matplotlib, scikit-learn, pandas + more), Matlab, Linux, git, bash, LaTeX, HPC/parallel computing (mpich), GPU development (PyTorch, Tensorflow), C/C++, Qiskit.

Awards & Grants

1. ANL LDRD Research grant: *Coherence-enhanced dark-field X-ray microscopy* (Role: PI; $930,000).
2. ANL LDRD Research grant: *detecting critical microstructural processes with AI* (Role: PI; $100,000).
3. Oak Ridge Institute for Science & Education (ORISE) post-doctoral fellowship (2016).
4. Indian Institute of Technology Madras Academic Merit Scholarship (2007 – 2009).
5. IIT Joint Admission to M.Sc (IIT-JAM) All-india rank 5 (out of $\simeq$ 4000) (2007).
6. Bangalore University undergraduate rank 5 (2007).

Professional Activities & Outreach (Full CV link)

- **Editorship**: *Crystals* special issue: Synchrotron Studies of Materials
- **Select invited talks**: The Minerals, Metals, Materials Society (TMS), Advanced Photon Source.
- **Society membership**: American Physical Society, Materials Research Society, TMS.
- **Select peer review**: US Department of Energy, American Physical Society, Optica.
- **Select workshop organization**: Advanced Photon Source User Meetings.

Select publications (Full CV link)

1. **Maddali, S.**, Frazer, T.D., Delegan, N. *et al*, *Concurrent multi-peak Bragg coherent x-ray diffraction imaging of 3D nanocrystal lattice displacement via global optimization*, **npj Computational Materials** 9, 77 (2023).
2. Wilkin, M., **Maddali, S.**, Hruszkewycz, S., Pateras, A., Sandberg, R., Harder, R., Cha, W., Suter, R., & Rollett, A. *Experimental demonstration of coupled multi-peak Bragg coherent diffraction imaging with genetic algorithms*, **Phys. Rev. B**, 103, 214103. (2021).
3. **Maddali, S.**, Allain, M., Cha, W., Harder, R., Park, J.S., Kenesei, P., Almer, J., Nashed, Y., & Hruszkewycz, S., *Phase retrieval for Bragg coherent diffraction imaging at high x-ray energies*, **Phys. Rev. A**, 99, 053838 (2019).
4. **Maddali, S.**, Park, J.S., Sharma, H., Shastri, S., Kenesei, P., Almer, J., Harder, R., Highland, M., Nashed, Y., & Hruszkewycz, S., *High-Energy Coherent X-Ray Diffraction Microscopy of Polycrystal Grains: Steps Toward a Multiscale Approach*, **Phys. Rev. Appl.**, 14, 024085 (2020).