

# Dr. Siddharth Maddali

Post-Doctoral Researcher  
Argonne National Laboratory  
(Department of Energy, UChicago Argonne LLC)  
Chicago, IL (USA)

**Email:** smaddali@anl.gov  
smaddali@alumni.cmu.edu  
www.linkedin.com/in/siddharthmaddali  
**Ph:** +1(412) 576-2406

## Education

- **Carnegie Mellon University** Pittsburgh, PA  
*PhD (Physics)* 2010 - Feb 2016
  - **PhD dissertation:**  
Computational mining of meso-scale physics from high-energy X-ray data sets
  - Advisor:** Dr. Robert M. Suter
- **Carnegie Mellon University** Pittsburgh, PA  
*MS Physics* 2009 - 2010
- **Indian Institute of Technology (IIT), Madras** Chennai, India  
*M.Sc Physics* 2007 - 2009
  - Master's thesis: Computational analysis of the vibrational modes of a solid sphere
- **Bangalore University** Bangalore, India  
*B.Sc. Physics* 2004 - 2007
  - Triple-major: physics, mathematics, electronics

## Research Interests

- X-ray physics, coherent diffraction imaging, ptychography
- Microstructure/nanostructure imaging
- Mesoscale phenomena and physics
- Computational materials science (inverse problems, optimization)
- Data science and machine learning for materials research
- Scientific software development (<https://github.com/siddharth-maddali>)

## Experience

- **Post-doctoral researcher** Argonne National Laboratory  
*Synchrotron Radiation Studies* January 2017 - present
- **Post-Doctoral Research Associate (ORISE)** National Energy Technology Laboratory  
*Computational Materials Research* May 2016 - November 2016
- **Graduate Research Assistant** Carnegie Mellon University  
*Computational/experimental materials research* 2012 - Feb 2016
- **Graduate Teaching Assistant** Carnegie Mellon University  
*Physics of Science Students* 2009 - 2012
- **Intern, Department of Physics** National University of Singapore  
*Summer Internship Program for Indian Students (SIPIS)* May 2008

## Publications

- [1] **S. Maddali**, J. S. Park, H. Sharma, S. D. Shastri, P. Kenesei, J. Almer, R. Harder, M. J. Highland, Y. S. G. Nashed, and S. O. Hruszkewycz. High-energy coherent x-ray diffraction microscopy of polycrystal grains: first steps towards a multi-scale approach, 2019. arXiv:1903.11815 [cond-mat.mtrl-sci] (under review).
- [2] N. Krishnamurthy, **S. Maddali**, J. A. Hawk, and V. N. Romanov. 9cr steel visualization and predictive modeling. *Computational Materials Science*, 2019.
- [3] **S. Maddali**, I. Calvo-Almazan, J. Almer, P. Kenesei, J.-S. Park, R. Harder, Y. Nashed, and S. O. Hruszkewycz. Sparse recovery of undersampled intensity patterns for coherent diffraction imaging at high x-ray energies. *Scientific Reports*, 8(1):4959, 2018.
- [4] S. O. Hruszkewycz, **S. Maddali**, C. P. Anderson, W. Cha, K. C. Miao, M. J. Highland, A. Ulvestad, D. D. Awschalom, and F. J. Heremans. Strain annealing of sic nanoparticles revealed through bragg coherent diffraction imaging for quantum technologies. *Phys. Rev. Materials*, 2:086001, Aug 2018.
- [5] N. Krishnamurthy, **S. Maddali**, A. Verma, L. Bruckman, J. Carter, R. French, V. Romanov, and J. Hawk. Data analytics for alloy qualification. Technical Report NETL-PUB-21550, 2017.
- [6] N. Krishnamurthy, **S. Maddali**, V. Romanov, and J. Hawk. Segmentation of 9cr steel samples based on composition and mechanical property. volume 62. APS, 2017.
- [7] N. Krishnamurthy, **S. Maddali**, V. Romanov, and J. Hawk. Predictive analysis of the influence of the chemical composition and pre-processing regimen on structural properties of steel alloys using machine learning techniques. volume 62. APS, 2017.
- [8] M. J. Highland, S. O. Hruszkewycz, D. D. Fong, Carol Thompson, P. H. Fuoss, I. Calvo-Almazan, **S. Maddali**, A. Ulvestad, E. Nazaretski, X. Huang, H. Yan, Y. S. Chu, H. Zhou, P. M. Baldo, and J. A. Eastman. In-situ synchrotron x-ray studies of the microstructure and stability of in2o3 epitaxial films. *Applied Physics Letters*, 111(16):161602, 2017.
- [9] **S. Maddali**, S. Ta'asan, and R. M. Suter. Topology-faithful nonparametric estimation and tracking of bulk interface networks. *Computational Materials Science*, 125:382–340, 2016.
- [10] **S. Maddali**. *Computational Mining of Meso-Scale Physics From High-Energy X-Ray Data Sets*. PhD thesis, Carnegie Mellon University, 2016. Ph.D Thesis.
- [11] L. Renversade, R. Quey, W. Ludwig, D. Menasche, **S. Maddali**, R. M. Suter, and A. Borbély. Comparison between diffraction contrast tomography and high-energy diffraction microscopy on a slightly deformed aluminium alloy. *IUCrJ*, 3(1):32–42, 2016.
- [12] A. Ulvestad, S. O. Hruszkewycz, M. V. Holt, M. O. Hill, I. Calvo-Almazan, **S. Maddali**, X. Huang, H. Yan, E. Nazaretski, Y. S. Chu, L. J. Lauhono, N. Rodkey, M. I. Bertoni, and M. E Stuckelburger. Multimodal x-ray imaging of grain-level properties and performance in a polycrystalline solar cell. (accepted for publication in *Journal of Synchrotron Radiation*).
- [13] **S. Maddali**, M. Allain, W. Cha, R. Harder, J. Almer, P. Kenesei, J.-S. Park, Y. Nashed, and S. O. Hruszkewycz. Phase retrieval for bragg coherent diffraction imaging at high x-ray energies. arXiv:1811.06181v1 [cond-mat.mtrl-sci] (under review).
- [14] Y. F. Shen, **S. Maddali**, D. Menasche, A. Bhattacharya, G. S. Rohrer, and R. M. Suter. Importance of outliers: a three-dimensional study of coarsening in  $\alpha$ -phase iron. (under review).
- [15] S. Kandel, **S. Maddali**, M. Allain, S. O. Hruszkewycz, C. Jacobsen, and Youssef S. G. Nashed. Using automatic differentiation as a general framework for ptychographic reconstruction. (under review).
- [16] I. Calvo-Almazan, M. Allain, **S. Maddali**, V. Chamard, and S. O. Hruszkewycz. Impact mitigation of angular uncertainties in bragg coherent diffraction imaging. (accepted for publication in *Scientific Reports*).

## Presentations

- (Invited) The Minerals, Metals & Materials Society (TMS), San Antonio, TX (Mar '19)
- Advanced Photon Source User Science Seminar, Lemont, IL (July '18)
- Coherence: International Workshop on Phase Retrieval and Coherent Scattering, Port Jefferson, NY (June '18)
- (Invited) Dept. of Physics, Carnegie Mellon University, Pittsburgh, PA (May '18)
- Materials Research Society, Phoenix, AZ (April '18)
- Gordon X-ray Science Conference & Seminar, Poster + Discussion leader, Easton, MA (Jul-Aug '17)
- Dept. of Mathematics, Georgia Institute of Technology, Seminar, Atlanta, GA (Nov '15)
- The Minerals, Metals & Materials Society (TMS), Poster, Orlando, FL (Mar '15)
- Materials Science & Technology (MS&T), Seminar, Pittsburgh, PA (Oct '14)
- Materials Science & Technology (MS&T), Poster, Pittsburgh, PA (Oct '12)

## Workshops

- Multiphysics Object-Oriented Simulation Environment (**MOOSE**) - open-source finite element engine (Idaho National Laboratory)
- Center for Causal Discovery (**CCD**) Summer Course '16, Pittsburgh, PA (USA)
- Machine Learning for Materials Research (**MLMR**) 2016, College Park, MD (USA)

## Awards, Grants, Honours

Institute Freeship (tuition waiver scholarship), IIT-Madras . . . . .	2007 - 2009
Ranked 5 in the nation-wide Joint Admission Test for M.Sc (JAM) for the IITs . . . . .	2007
Ranked 5 in Bangalore University for overall academic performance . . . . .	2007

## Professional Activities

- **Member:** Americal Physical Society (APS), Materials Research Society (MRS), The Minerals, Metals & Materials Society (TMS)
- **Reviewer:** *Philosophical Magazine*, *Computational Materials Science*