

Mathew J. Cherukara

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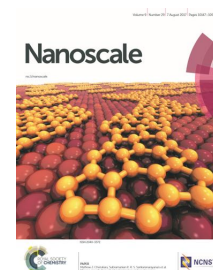
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Research Interests	Machine learning; Generative A.I., Deep neural networks, 4-D <i>operando</i> and ultra-fast pump-probe X-ray diffraction imaging; Bragg Coherent Diffraction Imaging (BCDI)
Education	<p>Ph.D, Materials Engineering, Purdue University 2015 Thesis: The kinetics of Ni/Al reactive intermetallic composites Advisor: Prof. Alejandro Strachan</p> <p>B.Tech,M.Tech, Metallurgical and Materials Engineering, 2010 Indian Institute of Technology (IIT), Madras Thesis: Non-equilibrium solidification of Heusler alloys Advisor: Prof. G. Phanikumar</p>
Experience	<p><i>Assistant Scientist</i> 2018-present CNM, Argonne National Laboratory</p> <p><i>Assistant Physicist (Term)</i> 2018 APS, Argonne National Laboratory</p> <p><i>Postdoctoral appointee</i> 2015-2018 APS, Argonne National Laboratory</p> <p><i>Graduate research assistant</i> 2010-2015 School of Materials Engineering, Purdue University</p> <p><i>Visiting research scholar</i> 2012-2014 Theoretical Division, Los Alamos National Laboratory</p>
Honors & Awards	<p>Outstanding Graduate Student Researcher award 2015 College of Engineering, Purdue University</p> <p>Best Poster award 2014 Defense Threat Reduction Agency (DTRA) Reviews</p> <p>Best Student Presentation award 2012 Materials Research Society (MRS)</p> <p>Institute Blues Award and Shankar Dayal Sharma medal 2010 For outstanding academic, extra-curricular and leadership. Given to 2 graduating students out of a class of 550 students, IIT Madras</p> <p>National Talent Search (NTSE) Scholar 2005 Awarded to 1000 out of 200,000 high school applicants in India</p>
Publications	<p><i>First author:</i></p> <ol style="list-style-type: none">Cherukara, M.J., Pokharel, R., O'Leary, T.S., Kevin Baldwin, J., Maxey, E., Cha, W., Maser, J., Harder, R.J., Fensin, S.J., Sandberg, R.L., Three-dimensional X-ray diffraction imaging of dislocations in polycrystalline metals under tensile loading, <i>Nature Communications</i>, Just accepted (2018), Impact Factor: 12.1
Citations: 290	
h-index: 11	
i10-index: 11	

2. **Cherukara, M.J.**,* Schulmann, D.,* Sasikumar, K.,* Arnold, A.J., Chan, H., Sadasivam, S., Cha, W., Maser, J., Das, S., Sankaranarayanan, S.K.R.S., Harder, R.J, Three-dimensional Integrated X-ray diffraction imaging of native strain in multi-layered WSe₂, *Nano Letters*, 18 (3), pp 1993-2000 (2018) **I. F.:** 12.7
3. **Cherukara, M.J.**,* Sasikumar, K.,* DiChiara A., Leake S.J., Cha, W., Dufresne, E.M., Peterka, T., McNulty I., Walko, D., Wen, H., Sankaranarayanan, S.K.R.S., Harder, R.J, Ultrafast Three-Dimensional Integrated Imaging of Strain in Core/Shell Semiconductor/Metal Nanostructures, *Nano Letters*, 17 (12), pp 76967701 (2017) **I. F.:** 12.7
4. Fang, Y.,* Jiang, Y.,* **Cherukara, M.J.**,* Shi, F., Koehler, K., Freyermuth, G., Isheim, D., Narayanan, B., Nicholls, A.W., Seidman, D.N., Sankaranarayanan, S.K.R.S., Tian, B., Alloy-assisted deposition of three-dimensional arrays of atomic gold catalyst for crystal growth studies, *Nature Communications*, 8, 2014 (2017) **I. F.:** 12.1
5. **Cherukara, M.J.**,* Narayanan, B.,* Chan, H., Sankaranarayanan, S.K.R.S., Silicene growth through island migration and coalescence, *Nanoscale*, 9, pp 10186-10192 (2017) **I. F.:** 7.4

- [Journal cover feature.](#)



6. **Cherukara, M.J.**,* Sasikumar, K.,* Cha, W., Narayanan, B., Leake S.J., Dufresne, E.M., Peterka, T., McNulty I., Wen, H., Sankaranarayanan, S.K.R.S., Harder, R.J, Ultra-fast Three-Dimensional X-ray Imaging of Deformation Modes in ZnO Nanocrystals, *Nano Letters*, 17, pp 11021108 (2017) **I. F.:** 12.7
 - News features: [ScienceDaily](#), [NanoWerk](#), [Phys.org](#)
7. **Cherukara, M.J.**,* Narayanan, B.,* Kinaci, A., Sasikumar, K., Gray, S.K., Chan, M.K.Y, Sankaranarayanan, S.K.R.S., Ab-initio Based Bond Order Potential To Investigate Low Thermal Conductivity Of Stanene Nanostructures, *The Journal of Physical Chemistry Letters*, 7, pp 3752-3759 (2016) **I. F.:** 9.3
 - News features: [EurekAlert!](#), [Phys.org](#), [ECNmag](#)
8. **Cherukara, M.J.**, Germann, T.C., Kober, E.M., Strachan, A., Shock loading of granular Ni/Al composites. Part 2: shock-induced chemistry, *The Journal of Physical Chemistry C*, 120, 12, pp 68046813 (2016) **I. F.:** 4.5
9. Wood, M.A.,* **Cherukara, M.J.**,* Kober, E.M., Strachan, A., Ultra-fast chemistry under non-equilibrium conditions and the shock to deflagration transition at the nanoscale, *The Journal of Physical Chemistry C*, 119,38, pp 2200822015 (2015) **I. F.:** 4.5
10. **Cherukara, M.J.**, Weihs T.P., Strachan A., Molecular dynamics simulations of the reaction mechanism in Ni/Al intermetallics, *Acta Materialia*, 96, 1-9 (2015) **I. F.:** 5.0
11. **Cherukara, M.J.**, Germann, T.C., Kober, E.M., Strachan, A., Shock loading of granular Ni/Al composites. Part 1: mechanics of loading, *The Journal of Physical Chemistry C*, 118, 45, pp 2637726386 (2014) **I. F.:** 4.5

12. **Cherukara, M.J.**, Vishnu, K., Strachan, A., Role of nanostructure on reaction and transport in Ni/Al intermolecular reactive composites, *Physical Review B*, 86, 075470 (2012) **I. F.:** 3.7

Co-author:

13. Patra, T.K., Zhang, F., Schulman, D.S., Chan, H., **Cherukara, M.J.**, Terrones, M., Das, S., Narayanan, B., Sankaranarayanan, S.K.R.S., Defect Dynamics in 2-D MoS2 Probed by Using Machine Learning, Atomistic Simulations, and High-Resolution Microscopy, *ACS Nano*, DOI: 10.1021/acsnano.8b02844 (2018) **I. F.:** 13.7
14. Loeffler, T.D., Chan, H., Narayanan, B., **Cherukara, M.J.**, Gray, S., Sankaranarayanan, S.K.R.S., Configurational-Bias Monte Carlo Back-Mapping Algorithm for Efficient and Rapid Conversion of Coarse-Grained Water Structures into Atomistic Models, *J. Phys. Chem B*, 122 (28), pp 7102-7110 (2018) **I. F.:** 3.15
15. Liu, H., Dong, Y., **Cherukara, M.J.**, Sasikumar, K., Narayanan, B., Cai, Z., Lai, B., Stan, L., Hong, S., Chan, M.K.Y., Sankaranarayanan, S.K.R.S., Zhou, H., Fong, D.D., Quantitative Observation of Threshold Defect Behavior in Memristive Devices with Operando X-ray Microscopy, *ACS Nano*, 12 (5), pp 4938-4945 (2018) **I. F.:** 13.7
16. Berman, D., Narayanan, B., **Cherukara, M.J.**, Sankaranarayanan, S.K.R.S., Erdemir, A., Zinovev, A., Sumant, A.V., Operando Tribochemical Formation of Onion-Like-Carbon Leads to Macroscale Superlubricity, *Nature Communications*, 9.1 (2018)
17. Zhang Z., Schwanz D., Narayanan, B., Kotiuga, M., Dura, J. A., **Cherukara, M.J.**, Zhou, H., Freeland J.W., Li, J., Sutarto, R., He, F., Chongzhao, W., Zhu, J., Sun, Y., Ramadoss, K., Nonnenmann, S.S., Nanfang Y., Comin, R., Rabe, K.M., Sankaranarayanan, S.K.R.S., Ramanathan, S., Perovskite nickelates as electric-field sensors in salt water, *Nature*, doi:10.1038/nature25008 (2017) **I. F.:** 40.1
- News features: [Purdue news](#)
18. Ulvestad, A., **Cherukara, M.J.**, Harder, R., Cha, W., Robinson, I.K., Song, S., Nelson, S., Zhu, D., Stephenson, G.B., Heinonen, O., Jokisaari, A., Bragg Coherent Diffractive Imaging of Zinc Oxide Acoustic Phonons at Picosecond Timescales, *Scientific Reports*, 7: 9823 (2017) **I. F.:** 4.2
19. Zuo, F., Panda, P., Kotiuga, M., Jiarui, L., Kang, M. G., Mazzoli, C., Zhou, H., Barbour, A., Wilkins S., Narayanan, B., **Cherukara, M.J.**, Zhang Z., Sankaranarayanan, S.K.R.S., Comin, R., Rabe, K.M., Roy, K., Ramanathan, S., Habituation based synaptic plasticity and organismic learning in a quantum perovskite, *Nature Communications*, 8: 240 (2017) **I. F.:** 12.1
- News features: [anl.gov](#)
20. Sasikumar, K.,* Narayanan, B.,* **Cherukara, M.J.**, Kinaci, A., Sen, F.G., Gray, S.K., Chan, M.K.Y., Sankaranarayanan, S.K.R.S., Evolutionary Optimization of a Charge Transfer Ionic Potential Model for Ta/TaOxide Heterointerfaces. *Chemistry of Materials*, 29 (8), pp 3603-3614 (2017) **I. F.:** 9.4
21. Manukyan K.V., Shuck, C.E., **Cherukara, M.J.**, Rouvimov, S., Kovalev, D.Y., Strachan, A., Mukasyan, A.S., Exothermic self-sustained waves with amorphous nickel, *The Journal of Physical Chemistry C*, 120, 10, pp 5827-5838 (2016) **I. F.:** 4.5

22. Morrison, K., **Cherukara, M.J.**, Kim, H., Strachan, A., Role of grain size on the martensitic transformation and ultra-fast superelasticity in shape memory alloys, *Acta Materialia*, 95, 37-43 (2015) **I. F.:** 5.0
23. Morrison, K., **Cherukara, M.J.**, Vishnu, K., Strachan, A., Role of atomic variability and mechanical constraints on the martensitic phase transformation of a model disordered shape memory alloy via molecular dynamics, *Acta Materialia* 69,30-36 (2014) **I. F.:** 5.0
24. Vishnu, K., **Cherukara, M.J.**, Kim, H., Strachan, A., Amorphous Ni/Al nanoscale laminates as high energy intermolecular reactive composites, *Physical Review B*, 85, 184206 (2012) **I. F.:** 3.7
25. Manukyan, K.V., Mason, B.A., Groven, L.J., Lin, Y., **Cherukara, M.J.**, Son, S.F., Strachan, A., Mukasyan, A.S., Tailored reactivity of Ni+Al nanocomposites: microstructural correlations, *The Journal of Physical Chemistry C*, 116, 21027-21038 (2012) **I. F.:** 4.5
26. Lin, K., Sullivan, S., **Cherukara, M.J.**, Strachan, A., nanoMATERIALS nanoscale heat transport tool on nanohub.org (DOI: 10.4231/D34Q7QQ1V)

**Book
Chapters**

Wood, M. A., **Cherukara, M. J.**, Antillon, E., Strachan, A., Molecular Dynamics Simulations of Shock Loading of Materials: A Review and Tutorial. *Reviews in Computational Chemistry*, (eds A. L. Parrill and K.B. Lipkowitz), John Wiley & Sons, Inc., Hoboken, NJ, USA. DOI: 10.1002/9781119356059.ch2 (2017)

Patents

Chan H., **Cherukara M.J.**, Narayanan, B., Sankaranarayanan, S.K.R.S., Machine learning technique to identify and characterize grains in polycrystalline materials, Docket No. 051583-0759, under process (2017)

Narayanan, B., Sankaranarayanan, S.K.R.S., Sumant, A.V., **Cherukara M.J.**, Berman, D., Systems and Methods for Designing New Materials for Superlubricity, Docket No. 051583-0838, under process (2018)