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Professional Appointments

- Postdoctoral Researcher**, Mechanical Engineering Sep 2023 - Present
Prof. Irene J. Beyerlein, University of California, Santa Barbara
- Postdoctoral Scholar**, Materials Science and Engineering Mar 2020 - Sep 2023
Prof. Timothy J. Rupert, University of California, Irvine
- Postdoctoral Researcher**, Materials Science and Engineering Dec 2019 - Jan 2020
Prof. Kiran N. Solanki, Arizona State University, Tempe

Education

- Ph.D., Materials Science and Engineering, Arizona State University** Dec 2019
Dissertation: “The effect of defects on functional properties of Niobium for superconducting radio-frequency cavities: A first-principles study.”
Advisor: Prof. Kiran N. Solanki
- BS & MS, Ceramic Engineering, Indian Institute of Technology (BHU) Varanasi** July 2014
Dissertation: “Effect of processing parameters on structural and mechanical properties of Graphene reinforced Aluminum matrix composites.”
Advisor: Prof. Devendra Kumar

Journal Publications ([Google Scholar Profile](#))

Total Publications: 30, 1st Author: 17, Google Scholar Citations: 1275, i10-index: 16

Published Manuscripts

- [J30] M.R. Jones, **P. Garg**, I.J. Beyerlein, “Role of chemical disorder in high temperature dislocation glide in refractory multi-principal element alloys”, *High Entropy Alloys & Materials* (Accepted).
- [J29] **P. Garg**, D.S. Gianola, T.J. Rupert, “Enhanced strain rate sensitivity of platelet linear complexion strengthened Al-Cu alloys”, *Scripta Materialia*, 271, 117002 (2026).
- [J28] M.R. Jones, **P. Garg**, I.J. Beyerlein, “Critical temperatures for ductile to brittle transition and athermal strength in refractory metals”, *Journal of Materials Research and Technology*, 38, 6229 (2025).
- [J27] **P. Garg**, K. Hemker, I.J. Beyerlein, “Stress and temperature dependence of screw dislocation motion in refractory multi-principal element alloys”, *High Entropy Alloys & Materials*, (2025) <https://doi.org/10.1007/s44210-025-00062-6>.
- [J26] **P. Garg**, M.R. Jones, N.E. Peterson, A.J. Clarke, I.J. Beyerlein, “Role of temperature on screw dislocation dynamics in Ta, W, and Ta-W alloy”, *Journal of Materials Research and Technology*, 35, 5521 (2025).

- [J25] N. Fuchs-Lynch, M. De Leo, **P. Garg**, S. Xu, N.A. Mara, I.J. Beyerlein, “3D interface size effects on slip transfer in Ti/Nb nanolaminates”, *International Journal of Plasticity*, 186 (2025).
- [J24] B.E. Rhodes, **P. Garg**, N.M. Ventura, J.A. Mayer, I.J. Beyerlein, D.S. Gianola, “Deformation pseudo-twinning of the L₂₁-ordered intermetallic superlattice”, *Scripta Materialia*, 257, 116468 (2025).
- [J23] M.R. Jones, **P. Garg**, I.J. Beyerlein, “Transitions in thermally activated glide mechanisms in the MoNbTaVW refractory multiprincipal element alloy up to 0.3T_m”, *Physical Review Materials*, 8, 103603 (2024).
- [J22] P. McNutt, M.R. Jones, **P. Garg**, I.J. Beyerlein, “Room temperature dislocation loop dynamics in body-centered cubic refractory multi-principal element alloys”, *Computational Materials Science*, 244, 113280 (2024).
- [J21] **P. Garg**, D.S. Gianola, T.J. Rupert, “Strengthening from dislocation restructuring and local climb at platelet linear complexions in Al-Cu alloys”, *Journal of Materials Science: Materials Theory*, 8,9 (2024).
- [J20] H. Vahidi, A.D. Dupuy, B. X. Lam, J. Cortez, **P. Garg**, T.J. Rupert, J.M. Schoenung, W.J. Bowman, “Reversible Enhancement of Electronic Conduction caused by Phase Transformation and Interfacial Segregation in an Entropy Stabilized Oxide”, *Advanced Functional Materials*, 2315895 (2024).
- [J19] **P. Garg** and T.J. Rupert, “Local structural ordering determines the mechanical damage tolerance of amorphous grain boundary complexions”, *Scripta Materialia*, 237, 115712 (2023).
- [J18] **P. Garg** and T.J. Rupert, “Grain incompatibility determines the local structure of amorphous grain boundary complexions”, *Acta Materialia*, 244, 118599 (2023).
- [J17] **P. Garg**, Z. Pan, V. Turlo, T.J. Rupert, “Segregation competition and complexion coexistence within a polycrystalline grain boundary network”, *Acta Materialia*, 218, 117213 (2021).
- [J16] P. Kumar, **P. Garg**, K.N. Solanki, I. Adlakha, “Effect of hydrogen on the ideal shear strength in metals and its implications on plasticity: A first-principles study”, *International Journal of Hydrogen Energy*, 46, 25726 (2021).
- [J15] **P. Garg**, C. Muhich, L.D. Cooley, T.R. Bieler, K.N. Solanki, “Possible role of grain-boundary and dislocation structure for the magnetic-flux trapping behavior of niobium: A first-principles study”, *Physical Review B*, 101, 184102 (2020).
- [J14] V.K. Beura, **P. Garg**, V.V. Joshi, K.N. Solanki, “Numerical investigation of micro-galvanic corrosion in Mg alloys: Role of the cathodic intermetallic phase size and spatial distributions”, *Magnesium Technology*, 217 (2020).
- [J13] **P. Garg**, A. Jamwal, D. Kumar, K.K. Sadasivuni, C.M. Hussain, P. Gupta, “Advance research progresses in aluminum matrix composites: manufacturing & applications”, *Journal of Materials Research and Technology*, 8, 5 (2019).
- [J12] C. Kale, **P. Garg**, B.G. Bazehhour, S. Srinivasan, M.A. Bhatia, P. Peralta, K.N. Solanki, “Oxygen effects on crystal plasticity of Titanium: a multiscale calibration and validation framework”, *Acta Materialia*, 176, 19 (2019).
- [J11] **P. Garg**, I. Adlakha, K.N. Solanki, “First-principles investigation of the effect of solutes on the ideal shear resistance and electronic properties of Mg”, *Magnesium Technology*, 231 (2019).

- [J10] I. Adlakha, **P. Garg**, K.N. Solanki, “Revealing the atomistic nature of dislocation-precipitate interactions in Al-Cu alloys”, *Journal of Alloys and Compounds*, 797, 325 (2019).
- [J9] **P. Garg**, T.R. Bieler, L. Cooley, K.N. Solanki, “A first-principles study on magnetic flux trapping at niobium grain boundaries”, *19th International Conference on RF Superconductivity*, TUP056, 567 (2019).
- [J8] **P. Garg**, M.A. Bhatia, K.N. Solanki, “Uncovering the influence of metallic and non-metallic impurities on the shear strength and ductility of Ti: An ab-initio study”, *Journal of Alloys and Compounds*, 788, 413 (2019).
- [J7] C. Kale, S. Turnage, **P. Garg**, I. Adlakha, S. Srinivasan, B.C. Hornbuckle, K.A. Darling, K.N. Solanki, “Thermo-mechanical strengthening mechanisms in a stable nanocrystalline binary alloy—A combined experimental and modeling study”, *Materials & Design*, 163, 107551 (2019).
- [J6] **P. Garg**, S. Balachandran, I. Adlakha, P.J. Lee, T.R. Bieler, K.N. Solanki, “Revealing the role of nitrogen on hydride nucleation and stability in pure niobium using first-principles calculations”, *Superconductor Science and Technology*, 31, 115007 (2018).
- [J5] S.A. Turnage, M. Rajagopalan, K.A. Darling, **P. Garg**, C. Kale, B.G. Bazehhour, I. Adlakha, B.C. Hornbuckle, C.L. Williams, P. Peralta, K.N. Solanki, “Anomalous mechanical behavior of nanocrystalline binary alloys under extreme conditions”, *Nature Communications*, 9, 2699 (2018).
- [J4] **P. Garg**, I. Adlakha, K.N. Solanki, “Effect of solutes on ideal shear resistance and electronic properties of magnesium: A first-principles study”, *Acta Materialia*, 153, 327 (2018).
- [J3] **P. Garg**, I. Adlakha, S. Balachandran, T.R. Bieler, P.J. Lee, K.N. Solanki, “Role of nitrogen on hydride nucleation in pure niobium by first-principles calculations”, *18th International Conference on RF Superconductivity*, THPB002, 741 (2018).
- [J2] **P. Garg**, M.A. Bhatia, S.N. Mathaudhu, K.N. Solanki, “Solute effect on strength and formability of Mg: A first-principles study”, *Magnesium Technology*, 483 (2017).
- [J1] **P. Garg**, P. Gupta, D. Kumar, O. Parkash, “Structural and mechanical properties of graphene reinforced aluminum matrix composites”, *Journal of Materials and Environmental Science*, 7 (2016).

Manuscripts in Preparation

- P. McNutt, **P. Garg**, I.J. Beyerlein, Phase-field dislocation dynamics modeling of higher-order dislocation slip in W-Re alloy.
- **P. Garg**, A.J. Clarke, I.J. Beyerlein, Oxygen effects on temperature-dependent critical stress for screw dislocation glide in tantalum.
- N.E. Peterson, **P. Garg**, I.J. Beyerlein, A.J. Clarke, Continuous and discontinuous dynamic recrystallization in BCC refractory multi-principal element alloys.
- **P. Garg**, N. Alemazkoor, T.J. Rupert, M. Tootkaboni, Multi-fidelity information fusion for accelerated predictive modeling and optimal design of high entropy alloys.
- N.M. Ventura, J.T. Pürstl, M.R. Jones, C. Frey, L.H. Mills, R. Silverstein, C. Tian, **P. Garg**, T.E.J. Edwards, W.S. Cunningham, A. Sharma, J.J. Schwiedrzik, X. Maeder, J. Michler, L. Valdevit, M.R. Begley, T.M. Pollock, I.J. Beyerlein, and D.S. Gianola. “Mechanical properties, activation parameters and dislocation plasticity of the Hf10Mo10Nb35Ta20Ti25 RMPEA at temperatures 200-300K investigated via single crystal micro-pillar compression”.
- D. Magnuson, **P. Garg**, I.J. Beyerlein, K. Hemker, Temperature-dependent deformation mechanisms in single-crystalline refractory multi-principal element alloys.

- **P. Garg**, K. Hemker, I.J. Beyerlein, Identifying the role of temperature on higher-order {112} slip system activity in refractory multi-principal element alloys.

Academic and Mentor Service

- Guest Editor: Metals, special issue on Structure and Properties of High-Entropy Alloys, 2025
- Graduate Poster Contest Judge at Materials Science and Technology Conference, 2024
- Providing research mentorship to incoming graduate students at UC, Santa Barbara
- Poster session judge at the 30th Annual Undergraduate Research Symposium by UC, Irvine
- Manuscript reviewer for Acta Materialia, Physical Review Materials, Computational Materials Science, Journal of Applied Science and Engineering, Materials Chemistry and Physics, Materials Today: Proceedings (> 40 manuscripts)

Awards and Recognition

- Recipient of Travel Award to attend the 10th International Conference on Multiscale Materials Modeling (MMM10), Baltimore, MD, Oct 2022
- Best Young Researcher Award (Engineering, Below 40 years) at 4th International Academic and Research Excellence Awards (IARE) 2022
- Graduate Travel Award, School for Engineering of Matter, Transport and Energy, Arizona State University, 2017

Selected Presentations

[P18] **P. Garg**, N. Peterson, A. Clarke, I. Beyerlein. “Dislocation mechanisms governing the continuous and discontinuous dynamic recrystallization behavior in refractory multi-principal element alloys”, *The Minerals, Metals and Materials Society (TMS) Annual Meeting and Exhibition*, Mar 2026, San Diego, CA (*Invited*).

[P17] **P. Garg**, D. Magnuson, K. Hemker, I. Beyerlein. “Temperature-dependent screw dislocation dynamics on multiple slip systems in MoNbTi refractory multi-principal element alloy”, *TMS Annual Meeting and Exhibition*, Mar 2026, San Diego, CA (*Upcoming*).

[P16] **P. Garg**, D. Magnuson, K. Hemker, I. Beyerlein. “Temperature-dependent screw dislocation dynamics in MoNbTi and TaNbTi multi-principal element alloys”, *TMS Annual Meeting and Exhibition*, Mar 2025, Las Vegas, NV.

[P15] **P. Garg**, M. Jones, A. Clarke and I. Beyerlein. “Role of Temperature on Screw Dislocation Dynamics in Ta, Ta-W, and TaNbTi”, *Materials Science and Technology (MS&T) Conference and Exhibition*, Oct 2024, Pittsburgh, PA.

[P14] **P. Garg**, and Irene J. Beyerlein. “Temperature-dependent Screw Dislocation Dynamics in BCC Refractory Multi-Principal Element Alloys Using PFDD Method”, *UCSB Autumn Materials Workshop*, Santa Barbara, CA, 2024 (*Poster*).

[P13] **P. Garg** and T. J. Rupert. “Local Structural Ordering Affects the Toughening Ability of Amorphous Grain Boundary Complexions”, *TMS Annual Meeting and Exhibition*, Mar 2023, San Diego, CA.

[P12] **P. Garg** and T. J. Rupert. “Incompatibility between neighboring grains determines the local structure of amorphous grain boundary complexions”, *The 10th International Conference on Multiscale Materials Modeling (MMM10)*, Oct 2022, Baltimore, MD.

[P11] **P. Garg**, Z. Pan, V. Turlo and T. J. Rupert. “Interfacial segregation and segregation-induced transitions in a polycrystalline grain boundary network”, *TMS Annual Meeting and*

Exhibition, Mar 2021, Virtual.

[P10] **P. Garg**, T.R. Bieler and K.N. Solanki. “Critical assessment of grain boundary role on the magnetic flux trapping in niobium”, TMS Annual Meeting, Feb 2020, San Diego, CA.

[P9] S. Nagar, **P. Garg**, N. Muthewgoda, M.A. Bhatia, I. Adlakha and K.N. Solanki. “A first-principles investigation on the co-segregation energetics of chromium-helium at grain boundaries in Fe”, TMS Annual Meeting and Exhibition, Feb 2020, San Diego, CA.

[P8] **P. Garg**, L. Cooley, P. Lee, T. Bieler and K. Solanki. “Magnetic flux trapping at grain boundaries in Nb: A first-principles study”, TMS Annual Meeting and Exhibition, 2019, San Antonio, TX (Poster).

[P7] **P. Garg**, T.R. Bieler and K.N. Solanki. “First-principles study of magnetic flux trapping behavior at lattice defects in niobium”, Cryogenic Engineering and International Cryogenic Materials Conference, Jul 2019, Hartford, CT.

[P6] **P. Garg**, T.R. Bieler and K.N. Solanki. “Revealing the role of grain boundary structures on magnetic flux trapping behavior in niobium”, MS&T Conference and Exhibition, 2018, Columbus, OH.

[P5] **P. Garg**, S. Balachandran, I. Adlakha, P. Lee, T. Bieler and K. Solanki. “Role of nitrogen on hydride nucleation in pure niobium by first-principles calculations compared with coupon microstructures”, 18th International Conference on RF Superconductivity, 2018 (Poster).

[P4] **P. Garg**, S. Balachandran, I. Adlakha, P.J. Lee, T.R. Bieler and K.N. Solanki. “Role of nitrogen on hydride nucleation and stability in niobium by first-principles calculations”, Materials Research Society Spring Meeting, Apr 2018, Phoenix, AZ.

[P3] **P. Garg** and K.N. Solanki. “Role of nitrogen on hydride nucleation and stability in pure niobium by first-principles calculations”, TMS Annual Meeting, Mar 2018, Phoenix, AZ.

[P2] **P. Garg**, I. Adlakha and K.N. Solanki. “Role of hydrogen on metal plasticity: An ab-Initio study”, TMS Annual Meeting and Exhibition, Mar 2017, San Diego, CA.

[P1] M.A. Bhatia, **P. Garg**, S.N. Mathaudhu, K.N. Solanki. “First-principles study of solute addition on the ideal shear strength of pure Magnesium”, TMS Annual Meeting and Exhibition, 2016, Nashville, TN.