

Calvin Robert Lear, PhD

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Education & Professional Experience

2022 – 2025: Scientist in MPA-CINT, Los Alamos National Laboratory
2018 – 2022: Postdoctoral Research Associate in MST-8, Los Alamos National Laboratory
2016 – 2018: Postdoctoral Research Fellow in Nuclear Engineering, University of Michigan
2011 – 2016: PhD in Materials Science, University of Illinois at Urbana-Champaign
2007 – 2011: BS in Materials Science, Virginia Tech (VPI&SU)

Recent Professional Activities

- Participated in the development of a solid-state joining technique suitable for hermetically sealing nuclear reactor cladding tubes: capacitive discharge resistance welding (CDRW). Lead microstructural characterization, nanoindentation, and ion irradiation experiments on FeCrAl alloy B126Y, oxide dispersion strengthened steel MA956, and nanostructured ferritic alloy 14YWT to prove efficacy.
- Analyzed microstructure, mechanical performance, and failure in cast alloy components for the US Navy, providing input for the development of improved qualification and installation procedures.
- Participated in the development of an in situ tempering technique for directed energy deposition (DED) additive manufacturing of ferritic-martensitic steels. Lead microstructural characterization, nanoindentation, and ion irradiation experiments on Grade 91 steel printed under various tempering conditions and served as acting project lead for final year.
- Participated in studies of low temperature irradiation and helium accumulation impacts on mechanical behavior. Lead microstructural characterization, nanomechanical testing, and ion irradiation efforts on pure metals, including aluminum, beryllium, copper, tin, and titanium. Used nanopillar compression to study transitions in material strength between quasi-static and dynamic strain rate regimes.
- Investigated radiation-induced grain boundary roughening in pure nickel using in situ ion irradiation in transmission electron microscopes at Argonne National Laboratory (IVEM) and the University of Michigan (I3TEM). Part of an internally funded experimentalist-modeler partnership.
- Developed a Matlab-based tool to extract key features from velocimetry spectrograms generated during shock loading experiments, replacing human identification with an objective process.
- Maintained an existing Python-based tool for constitutive strength model optimization, expanding from one model to six and interfacing with the Granta materials testing database at Los Alamos National Laboratory (“Granta”) to import experimental stress-strain data and to export model parameters.
- Developed a Python-based tool to allow experimentalists, modelers, and designers to directly with Granta, facilitating the uploading, downloading, editing, and processing of data across the Laboratory.
- Served as primary and alternative person-in-charge of the MPA-CINT Metallographic Preparation Lab (“Metlab”) at Los Alamos National Laboratory, overseeing safety, chemical inventory, waste handling, and general operations. Mentored students and junior technicians and staff on metallographic best practices, microstructural analysis, and general metallurgy.
- Served on the Programming Subcommittee of the Nuclear Materials Committee for the Minerals, Metals, and Materials Society (TMS).
- Served as a Review Editor for the journal *Frontiers in Nuclear Engineering*.

Significant Awards and Honors: None

Relevant Peer Reviewed Journal Articles – 18 Total

- C.R. Lear**, M.R. Chancey, R. Flanagan, J.G. Gigax, M.T. Hoang, D.R. Jones, H. Kim, D.T. Martinez, B.M. Morrow, N. Mathew, Y. Wang, N. Li, J.R. Payton, M.B. Prime, and S.J. Fensin, “Transition in helium bubble strengthening of copper from quasi-static to dynamic deformation”, *Acta Materialia*, 254, 118987, 2023.
- J.C.F. Millett, S.J. Fensin, G.D. Owen, B.P. Eftink, **C.R. Lear**, G. Whiteman, and G.T. Gray III, “The mechanical and microstructural response of single crystal aluminium to one dimensional shock loading: The effects of orientation”, *Acta Materialia*, 246, 118727, 2023.
- C.R. Lear**, J.G. Gigax, O. El Atwani, M.R. Chancey, H. Kim, N. Li, Y. Wang, and S.J. Fensin, “Effects of helium cavity size and morphology on the strength of pure titanium”, *Scripta Materialia*, 212, 114531, 2022.
- S.J. Fensin, D.R. Jones, D. Martinez, **C.R. Lear**, and J. Payton, “The role of helium on ejecta production in copper”, *Materials*, 13, p. 1270, 2020.
- C.R. Lear**, M. Song, M. Wang, and G.S. Was, “Dual ion irradiation of commercial and advanced alloys: Evaluating microstructural resistance for high dose core internals”, *Journal of Nuclear Materials*, 516, p. 125, 2019.
- C.R. Lear**, R.S. Averback, P. Bellon, A.E. Sand, and M.A. Kirk, “Unusual irradiation-induced disordering in Cu₃Au near the critical temperature: An in situ study using electron diffraction”, *Journal of Materials Research*, 33, p. 3841, 2018.
- M. Song, **C.R. Lear**, C.M. Parish, M. Wang, and G.S. Was, “Radiation tolerance of commercial and advanced alloys for core internals: a comprehensive microstructural characterization”, *Journal of Nuclear Materials*, 510, p. 396, 2018.
- S.J. Dillon, D.C. Bufford, G.S. Jawaharram, X. Liu, **C.R. Lear**, K. Hattar, and R.S. Averback, “Irradiation-induced creep in metallic nanolaminates characterized by in situ TEM pillar nanocompression”, *Journal of Nuclear Materials*, 490, p. 59, 2017.
- J.Y. Lee, **C.R. Lear**, X. Zhang, P. Bellon, and R.S. Averback, “Irradiation-induced nanoprecipitation in Ni-W alloys”, *Metallurgical and Materials Transactions A*, 46:3, p. 10461061, 2014.

Recent Collaborators

- Oak Ridge National Laboratory – T.S. Byun, T.G. Lach, W. Zhong
- Los Alamos National Laboratory – S.J. Fensin, G.T. Gray III, P. Schembri, N. Li, Y. Wang, N. Mathew, M.B. Prime, D.R. Jones, B.P. Eftink, J.G. Gigax
- Pacific Northwest National Laboratory – S.A. Maloy, O. El Atwani
- University of California, Berkeley – P. Hosemann, S. Samuha
- Penn State – T. DebRoy, T. Mukherjee
- Atomic Weapons Establishment (AWE) – J.C.F. Millett
- Optomec, Inc. – T.J. Lienert
- Edison Welding Institute (EWI) – J.E. Gould, L. Lindamood

Graduate and Postdoctoral Advisors

- Los Alamos National Laboratory – S.J. Fensin and S.A. Maloy
- University of Michigan – G.S. Was
- University of Illinois at Urbana-Champaign – R.S. Averback and P. Bellon

Graduate Students and Postdoctoral Scholars Supervised: None