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Nuclear Fuel Element Performance Group

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EDUCATION AND TRAINING:

Degree	Year	Area/Major	Institution
Ph.D	2010	Nuclear Engineering	North Carolina State University, Raleigh, NC
MS	2007	Nuclear Engineering	North Carolina State University, Raleigh, NC
BS	2005	Nuclear Engineering	Texas A&M University, College Station, TX

RESEARCH AND PROFESSIONAL EXPERIENCES:

Senior Research and Development Staff and Group Leader **October 2020 to present**

Nuclear Fuel Element Performance Group

Research and Development Staff,

June 2019 to September 2020

Nuclear Fuel Materials Group

Oak Ridge National Laboratory, Oak Ridge, TN

Collect and supervise the collection of postirradiation examination data to better understand nuclear fuel performance, and the design of irradiation tests to better inform fuel performance. Current studies include evaluating irradiation effects on nuclear fuel performance on a variety of different fuel types for different reactors. Specifically, examination on fuel samples from the MiniFuel irradiation vehicle, that allows for rapid screening and evaluation of novel fuel concepts, and examinations of commercial accident tolerant (ATF) and LWR high burnup fuel.

Research and Development Engineer,

September 2010 to May 2019

Advanced Characterization and Post Irradiation Examination

Idaho National Laboratory, Idaho Falls, ID

SELECTED PUBLICATIONS FROM PEER REVIEWED JOURNALS: SCOPUS H-INDEX 18

Capps, N., Jensen, C., Cappia, F., Harp, J., Terrani, K., Woolstenhulme, N., & Wachs, D. (2021). A Critical Review of High Burnup Fuel Fragmentation, Relocation, and Dispersal under Loss-Of-Coolant Accident Conditions. *J. of Nucl. Materials*, 546, 152750. <https://doi.org/10.1016/j.jnucmat.2020.152750>

Capps, N., Jensen, C., Cappia, F., Harp, J., Terrani, K., Woolstenhulme, N., & Wachs, D. (2021). A Critical Review of High Burnup Fuel Fragmentation, Relocation, and Dispersal under Loss-Of-Coolant Accident Conditions. *J. of Nucl. Materials*, 546, 152750. <https://doi.org/10.1016/j.jnucmat.2020.152750>

J.M. Harp, R.N. Morris, C.M. Petrie, J.R. Burns, K.A. Terrani, Postirradiation examination from separate effects irradiation testing of uranium nitride kernels and coated particles R, *J. Nucl. Mater.* 544 (2021) 152696. doi:10.1016/j.jnucmat.2020.152696.

T. Yao, L. Capriotti, J.M. Harp, X. Liu, Y. Wang, F. Teng, D.J. Murray, A.J. Winston, J. Gan, M.T. Benson, L. He, α -U and ω -UZr₂ in neutron irradiated U-10Zr annular metallic fuel, *J. Nucl. Mater.* 542 (2020) 152536. doi:10.1016/j.jnucmat.2020.152536.

L. Capriotti, J.M. Harp, Characterization of a minor actinides bearing metallic fuel pin irradiated in EBR-II, *J. Nucl. Mater.* 539 (2020) 152279. doi:10.1016/j.jnucmat.2020.152279.

F. Cappia, K. Tanaka, M. Kato, K. McClellan, J. Harp, Post-irradiation examinations of annular mixed oxide fuels with average burnup 4 and 5% FIMA, *J. Nucl. Mater.* (2020) 152076. doi:10.1016/J.JNUCMAT.2020.152076.

- K.A. Terrani, B.C. Jolly, J.M. Harp, Uranium nitride tristructural-isotropic fuel particle, *J. Nucl. Mater.* 531 (2020) 152034. doi:10.1016/J.JNUCMAT.2020.152034.
- F. Cappia, B.D. Miller, J.A. Aguiar, L. He, D.J. Murray, B.J. Frickey, J.D. Stanek, J.M. Harp, Electron microscopy characterization of fast reactor MOX Joint Oxide-Gaine (JOG), *J. Nucl. Mater.* 531 (2020) 151964. doi:10.1016/J.JNUCMAT.2019.151964.
- J.M. Harp, L. Capriotti, D.L. Porter, J.I. Cole, U-10Zr and U-5Fs: Fuel/cladding chemical interaction behavior differences, *J. Nucl. Mater.* 528 (2020) 151840. doi:10.1016/j.jnucmat.2019.151840.
- F. Cappia, J.M. Harp, Postirradiation examinations of low burnup U3Si2 fuel for light water reactor applications, *J. Nucl. Mater.* 518 (2019) 62–79. doi:10.1016/J.JNUCMAT.2019.02.047.
- J.M. Harp, L. Capriotti, H.J.M. Chichester, Postirradiation Examination of FUTURIX-FTA metallic alloy experiments, *J. Nucl. Mater.* 515 (2019) 420–433. doi:10.1016/J.JNUCMAT.2018.12.051.
- J.M. Harp, H.J.M. Chichester, L. Capriotti, Postirradiation examination results of several metallic fuel alloys and forms from low burnup AFC irradiations, *J. Nucl. Mater.* 509 (2018) 377–391. doi:10.1016/j.jnucmat.2018.07.003.
- L. He, J.M. Harp, A.R. Wagner, R.E. Hoggan, K.R. Tolman, Hydrothermal synthesis of silicon oxide clad uranium oxide nanowires, *J. Am. Ceram. Soc.* 101 (2018). doi:10.1111/jace.15295
- J.M. Harp, P.A. Demkowicz, J.D. Stempien, Fission product inventory and burnup evaluation of the AGR-2 irradiation by gamma spectrometry, *Nucl. Eng. Des.* 329 (2018) 134–141. doi:10.1016/j.nucengdes.2017.08.005.
- J.M. Harp, D.L. Porter, B.D. Miller, T.L. Trowbridge, W.J. Carmack, Scanning electron microscopy examination of a Fast Flux Test Facility irradiated U-10Zr fuel cross section clad with HT-9, *J. Nucl. Mater.* 494 (2017) 227–239. doi:10.1016/j.jnucmat.2017.07.040.
- J.M. Harp, P.A. Lessing, R.E. Hoggan, Uranium silicide pellet fabrication by powder metallurgy for accident tolerant fuel evaluation and irradiation, *J. Nucl. Mater.* 466 (2015) 728–738. doi:10.1016/j.jnucmat.2015.06.027
- J.M. Harp, P.A. Demkowicz, P.L. Winston, J.W. Sterbentz, An analysis of nuclear fuel burnup in the AGR-1 TRISO fuel experiment using gamma spectrometry, mass spectrometry, and computational simulation techniques, *Nucl. Eng. Des.* 278 (2014) 395–405. doi:10.1016/j.nucengdes.2014.07.041

SYNERGISTIC ACTIVITIES AND AWARDS:

- 2005 Advanced Fuel Cycle Initiative Fellow
- 2015-present Generation IV International Forum – Advanced Fuel Project, US Department of Energy Representative
- 2015-2019 US-Japan Civilian Nuclear Working Group Fuel Cycle Waste Management Advanced Fuels sub-working group member
- 2016 Best Paper PIE track HTR-2016 for “Fission Product Inventory and Burnup Evaluation of the AGR-2 Irradiation by Gamma Spectrometry,”
- 2016-present OECD-NEA Expert Group on Innovative Fuel - US Department of Energy Representative
- Recognized Reviewer for the following journals: *Journal of Nuclear Materials*, *Nuclear Engineering and Design*, *Annals of Nuclear Energy*, *Journal of Physics and Chemistry of Solids*, *Nuclear Instruments and Methods B*