

## Raluca O. Scarlat

Assistant Professor

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### RESEARCH AREAS

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Chemistry and materials. Electrochemistry and physical chemistry of molten salts, high-temperature graphite chemistry, corrosion, tritium management. Advanced nuclear reactors, safety analysis, and engineering ethics.

### EDUCATION

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Ph. D. Nuclear Engineering with Designated Emphasis in Energy Science and Technology, UC Berkeley, 2012

M.S. Nuclear Engineering, UC Berkeley, 2009

Certificate in Management of Technology, Haas School of Business, UC Berkeley, 2009

B.S. Chemical and Biomolecular Engineering, Cum Laude, Cornell University, 2006

### EXPERIENCE

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01/2019 – Present	<i>Assistant Professor</i> , Department of Nuclear Engineering, University of California Berkeley.
08/2014 – 12/2018	<i>Assistant Professor</i> , Department of Engineering Physics, University of Wisconsin Madison.
11/2017 – 12/2018	<i>Affiliate Faculty</i> , Department of Material Science and Engineering
10/2017 – 12/2018	<i>Affiliate Faculty</i> , Department of Physics
03/2015 – 12/2018	<i>Affiliate Faculty</i> , Department of Mechanical Engineering
01/2013 – 08/2014	<i>Postdoctoral Scholar</i> , Peterson Research Group, Department of Nuclear Engineering, University of California Berkeley
09/2011 – 10/2011	<i>Engineering Intern</i> , Nuclear Reactor Engineering, Plant Engineering Department, Hitachi-GE Power Systems, Hitachi, Japan
06/2008 – 12/2012	<i>Ph.D Student</i> , Peterson Research Group, Department of Nuclear Engineering, University of California Berkeley
07/2006 – 08/2007	<i>Chemical Engineer</i> , Automation and Optimization Division, ExxonMobil Research & Engineering, Fairfax, VA
05/2005 – 08/2005	<i>Research Intern</i> , Polymer and Chemical Technology Group, GE Global Research Center, Niskayuna, NY
06/2004 – 05/2006	<i>Research Assistant</i> , Wiesner Research Group, Material Science and Engineering Department, Cornell University
08/2004 – 01/2005	<i>Engineering Co-op</i> , Technology Department of the Waterford Silicones Chemical Plant, GE Silicones, Waterford, NY

### AWARDS, HONORS, AND SELECTED PROFESSIONAL ACTIVITIES

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External advisory board member. LIBRA ArpaE Project. MIT Plasma & Fusion Science Center. 2022-present.

Working Group Member. ASME Standards task group on graphite issues for MSR. 2022-present.

Working Group Member. Development of ANS 20.2 Standard, “Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt Reactor Nuclear Power Plants.” 2020-2022.

Special issue editor. JOM Journal special issue: “Materials Interactions with Molten Salt for Nuclear Reactors.” 2022.

Nuclear Energy Advisory Committee (NEAC), US Department of Energy, Office of Nuclear Energy, 2022.

ANS Mary Jane Oestmann Professional Women's Achievement Award, 2021.

Vilas Faculty Early Career Investigator Award, University of Wisconsin-Madison, 2018.

Excellence Award, Nuclear Energy Fuel Cycle R&D, US Department of Energy, 2009

Leadership Award, ExxonMobil Automation & Optimization Division, 2006

## PUBLICATIONS (selected)

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### SALT CHEMISTRY AND ELECTROCHEMISTRY

- L. Langford, N. Winner, A. Hwang, H. Williams, L. Vergari, R. O. Scarlat, M. Asta. [Constant-Potential Molecular Dynamics Simulations of Molten-Salt Double Layers for FLiBe and FLiNaK](#). *Journal of Chemical Physics*. 2022.
- R. Vidrio, S. Mastromarino, E. Still, L. Chapdelaine, R. O. Scarlat. Density and Thermal Expansivity of Molten 2LiF-BeF<sub>2</sub> (FLiBe): Measurements and Uncertainty Quantification. *J. of Chem. & Engr. Data*. 2022 (accepted).
- S. R. Scott, F. Carotti, A. Kruizenga, R. O. Scarlat, S. Mastromarino, M. M. Shafer. [Simultaneous measurement of lithium isotope and lithium/beryllium ratios in FLiBe salts using MC-ICP-MS](#). *J. Anal. At. Spectrom.* 37 (2022) 1193-1202. 2022.
- F. Carotti, H. Wu, and R. O. Scarlat. [Characterization of a Thermodynamic Reference Electrode for Molten LiF-BeF<sub>2</sub> \(FLiBe\)](#). *Journal of The Electrochemical Society*, 164 (12) H854-H861 (2017).

### CORROSION

- R. O. Scarlat, L. Vergari, R. D. Hayes, M. Fratoni. The corrosion effects of neutron activation of 2LiF-BeF<sub>2</sub> (FLiBe). *Nuclear Materials and Energy*. 2023.
- N. Winner, H. Williams, R. O. Scarlat, M. Asta. [Ab-initio simulation studies of chromium solvation in molten fluoride salts](#). *Journal of Molecular Liquids*. 335 (2021) 116351.
- F. Schmidt, P. Hosemann, R. O. Scarlat, D. K. Schreiber, J. R. Scully, B. P. Uberuaga. [Effects of Radiation-Induced Defects on Corrosion](#). *Annual Reviews of Materials Research*. 51 (2021) 293-328.
- R. O. Scarlat. [CrF<sub>2</sub> Solubility in 2LiF-BeF<sub>2</sub>: Comment on "An integrated model of tritium transport and corrosion in Fluoride Salt-Cooled High-Temperature Reactors \(FHRs\) – Part I: Theory and benchmarking."](#) *Nuclear Engineering and Design*. 335 (2018) 389-390.

### GRAPHITE

- L. Vergari, J. Quincey, G. Meric, T. Merriman, M. Hackett, R. O. Scarlat. High Temperature Self-lubrication of Nuclear Graphite in Argon. *Tribology International*. 2022.
- L. Vergari and R. O. Scarlat, [Thermodynamics of hydrogen in graphite at high temperature and the effects of oxidation, irradiation and isotopics](#). *Journal of Nuclear Materials* (2021) 152797.
- L. Vergari and R. O. Scarlat, [Kinetics and Transport of Hydrogen in Graphite at High Temperature and the Effects of Oxidation, Irradiation and Isotopics](#). *Journal of Nuclear Materials* (2021) 153142. (Jun. 2021)
- H. Wu, R. Gakhar, A. Chen, S. Lam, C. P. Marshall, R. O. Scarlat. [Comparative analysis of microstructure and reactive sites for nuclear graphite IG-110 and graphite matrix A3](#). *Journal of Nuclear Materials*. 528 (2020) 151802 (Sept. 2019).
- H. Wu, F. Carotti, N. Patel, R. Gakhar, R. O. Scarlat. [Fluorination of Nuclear Graphite IG-110 in Molten FLiBe salt at 700 oC](#). *Journal of Fluorine Chemistry*. 211. 159-170 (2018).

### TRITIUM

- L. Vergari, R. O. Scarlat, R. D. Hayes, M. Fratoni. The corrosion effects of neutron activation of 2LiF-BeF<sub>2</sub> (FLiBe). *Nuclear Materials and Energy*. 2023.
- L. Vergari and R. O. Scarlat, [The impact of neutron irradiation, graphite oxidation and fluorination on tritium uptake into and desorption from graphite in molten salt environments](#). *Fusion Engineering and Design* 168 (2021) 112627.
- F. Carotti, E. Liu, D. Macdonald, R. O. Scarlat. [An Electrochemical Study of Hydrogen in Molten FLiBe with Addition of LiH](#). *Electrochimica Acta*. 137114 (Sept. 2020).
- Feng Xie, Jianzhu Cao, Liqiang Wei, Jiejuan Tong, Yujie Dong, Zuoyi Zhang, R. O. Scarlat. [Study of Tritium in the Primary Loop of HTR-10: Experiment and Theoretical Calculations](#). *Progress in Nuclear Energy*. 105. 99-105 (2018).

### SAFETY ANALYSIS AND NUCLEAR REACTOR DESIGN

- M. Abou Dbai, R. O. Scarlat, M. Trujillo. [Radiative Heat Transfer in FLiBe Molten Salt Participating Medium in a Vertical Heated Tube Under Forced and Mixed Convection Laminar Flows](#). *Nuclear Engineering and Design*. 368 (2020) 110775.
- J. E. Seifried, R. O. Scarlat, P. F. Peterson, E. Greenspan. [A General Approach for Determination of Acceptable FLiBe Impurity Concentrations in FHRs](#). *Nuclear Engineering and Design*. 343: 85-95 (2019).
- R. O. Scarlat, A.T. Cisneros, T. Koutchesfahani, R. Hong, P. F. Peterson, [Preliminary safety analysis of a PBMR supplying process heat to a co-located ethylene production plant](#). *Nuclear Engineering and Design* 251 53-59 (2012).
- R. O. Scarlat, M. R. Laufer, E. D. Blandford, N. Zweibaum, D. L. Krumwiede, A.T. Cisneros, C. Andreades, C.W. Forsberg, E. Greenspan, L. Hu, P. F. Peterson. [Design and licensing strategies for the fluoride-salt-cooled, high-temperature reactor \(FHR\) technology](#). *Progress in Nuclear Energy*. 77, 2014. 406-420.