



Mechanical Engineering Seminar Series

**From materials selection to deployment
and degradation.**

**Synergies and differences between different radiation-
induced defects and their meaning for performance.**

Peter Hosemann

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University of California Berkeley*



Tuesday, March 29, 2022

4:00 p.m. - 1303 EECS

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Abstract

Nuclear engineering provides some of the most interesting materials science challenges combining physical, chemical, and nuclear properties of matter driving materials selection to multi-dimensional space facilitating the interest in advanced manufacturing techniques facilitating gradient materials.

Ionizing radiation can lead to multiple degradation mechanisms. Displacement damage leads to non-equilibrium point defect concentrations further fostering the development of dislocation loops, stacking fault tetrahedrons, voids, and enhanced or dissolving precipitation in alloys. Transmutation of elements can lead to the build-up of noble gases like Helium which can form He bubbles. While both lead to changes in microstructure and properties, the nature of both defects is rather different. Small-scale mechanical testing, in combination with ion implantation, enables separate effects testing and uncovers the different deformation processes taking place in an efficient fashion. This presentation aims to highlight the different phenomena in recent examples relevant to nuclear applications.

Bio

Peter Hosemann is a Professor in the Department for Nuclear Engineering and Mechanical Engineering at the University of California Berkeley and current department chair in NE. Professor Hosemann received his Ph.D. in Material Science from the Montanuniversität Leoben, Austria in 2008. During that time he conducted research on lead-bismuth eutectic corrosion, ion beam irradiation, and micro scale mechanical testing, which was carried out at the Los Alamos National Laboratory. He continued his research at Los Alamos National Laboratory and joined the UC Berkeley faculty in 2010. Professor Hosemann has authored more than 200 peer-reviewed publications since 2008. In 2014 he won the best reviewer of the journal of nuclear materials award and the ANS literature award. In 2015 he won the TMS early-career faculty fellow award, the AIME Robert Lansing Hardy Award, and was awarded the E. S. Kuh Chair of the College of Engineering at UCB. He was the recipient of the TMS-Brimacombe medal 2022. While being dedicated to his research and teaching he also leads the UC Berkeley Bladesmithing team, which won the title of “the best example of a traditional blade” and “commendation beauty” for UC Berkeley. He's also the lead faculty for the CalSol solar car racing team which won the American Solar Challenge for Berkeley in 2017.

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