

Tuning materials chemistry and microstructure to enhance properties for applications in extreme environments

Dr. Haiming Wen

Associate Professor

**Dept. of Materials Science and Engineering &
Dept. of Nuclear Engineering and Radiation
Science, Missouri S&T**



**Chemistry
Seminar on
Microstructures
of Materials**

**Monday
Sept 18 at 4
pm in 303
Schrenk**

**Please contact
Dr. Amitava
Choudhury at
choudhurya@mst.edu
for further
information.**

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Abstract: There are critical societal needs to have clean energy, improve energy efficiency, and enhance the safety and reliability of energy systems. Nuclear energy is an important form of clean energy and plays a notable role in decarbonizing the economy and combating the climate change. Materials used in nuclear reactors are subjected to severe damages by the extremely harsh environments, including intense irradiation, high temperature, high mechanical stress, and corrosive atmosphere. Life extension of current nuclear reactors and development of next-generation nuclear reactors require more robust materials with enhanced properties and performance. There are two approaches to enhancing irradiation resistance: 1) engineering microstructure of existing materials, and 2) developing new materials with new compositions. In this seminar, research projects will be discussed involving nano science and engineering in an effort to manufacture and evaluate nanostructured steels with enhanced mechanical properties and irradiation resistance (steels are the most used materials in nuclear reactors). New materials, specifically high-entropy alloys, have also been developed, fabricated using different manufacturing techniques, and assessed for mechanical properties, high temperature stability and irradiation performance. The microstructures of the materials are tailored on the nanometer scale in order to achieve enhanced properties.

About the speaker: Dr. Wen is an Associate Professor in Department of Materials Science and Engineering and Department of Nuclear Engineering and Radiation Science at Missouri S&T. He obtained his PhD from University of California – Davis in 2012, and subsequently held postdoctoral appointments at Northwestern University and Idaho National Laboratory. Prior to joining Missouri S&T, he was a Research Assistant Professor at Idaho State University and a staff scientist at Idaho National Laboratory. Dr. Wen has extensive experience in research and development of advanced materials, especially those for extreme environments including nuclear and aerospace. He has been leading multiple research projects funded by Department of Energy, National Science Foundation, and Nuclear Regulatory Commission. Dr. Wen has authored or coauthored more than 75 peer-reviewed journal publications, with citations >3,850 and an h-index of 26. He serves on the Editorial Board of the journal *Materials Science and Engineering A*, and has served as the lead guest-editor of special issues in *Journal of Metals* and *AIMS Materials Science*. He regularly reviews manuscripts for many journals and research proposals for DOE and NSF. He was named CEC Dean’s Scholar, and received an Outstanding Teaching Award from Missouri S&T in 2022.