**An Introduction and Superior High-Temperature Strength in a Refractory High-Entropy Alloy**

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An introduction of high-entropy alloys will be presented. To achieve high strength at elevated temperatures, one hurdle that needs to be overcome is the materials softening due to heat. In the present work, a single-phase body-centered-cubic (bcc) CrMoNbV refractory high-entropy alloy (RHEA) with excellent high-temperature strength was designed using intrinsic material characteristics as the principles for alloy design [1]. The cause of superior strength at elevated temperatures was studied with in-situ neutron scattering, transmission-electron microscopy, and first-principles calculations. It was revealed that large atomic-size and elastic-modulus mismatches, elastic constants insensitivity to temperature, and the dominance of non-screw character of dislocations caused by solute pinning are the probable causes of strength retention at elevated temperature in CrMoNbV. This study has provided insight into understanding the materials design for elevated-temperatures applications.

[1] R. Feng, B. Feng, M. C. Gao, C. Zhang, J. C. Neuefeind, J. D. Poplawsky, Y. Ren, K. An, M. Widom, P. K. Liaw. Advanced Materials. **33, no. 48** p.2102401 (2021).

**Peter K. Liaw** graduated from Chiayi high school andobtained his B.S. in Physics from the National Tsing Hua University, Taiwan, and his Ph.D. in Materials Science and Engineering from Northwestern University, US, in 1980. After working at the Westinghouse Research and Development (R&D) Center for thirteen years, he joined the faculty and became an Endowed Ivan Racheff Chair of Excellence in the Department of Materials Science and Engineering at The University of Tennessee (UT), Knoxville in March 1993. He has worked in the areas of fatigue, fracture, nondestructive evaluation, and life-prediction methodologies of structural alloys and composites. Since joining UT, his research interests include mechanical behavior, neutron and synchrotron diffraction, bulk-metallic glasses, high-entropy alloys, and processing of high-temperature alloys and ceramic-matrix composites and coatings, with the kind help of his team members and colleagues at UT and Oak Ridge National Laboratory, and throughout the world. He has been a 2022 and 2023 Highly Cited Researcher from Clarivate™. He has published one thousand, four hundred, and four journal papers, including papers in Science, Nature Materials, Nature Communications, Science Advances, Advanced Materials, Acta Materialia, etc., edited and written seventy-one books, special journal issues, and book chapters, and presented numerous plenary, keynote, and invited talks at various national and international conferences. He was awarded the Royal E. Cabell Fellowship at Northwestern University. He is the recipient of several “Outstanding Performance” awards from the Westinghouse R&D Center. He was the Chairman of The Minerals, Metals and Materials Society (TMS) “Mechanical Metallurgy” Committee, and Chairman of the American Society for Metals (ASM) “Flow and Fracture” Committee. He has been the Chairman and Member of the TMS Award Committee on “Application to Practice, Educator, and Leadership Awards.” He is a Fellow of ASM, MRS, and TMS. He has been given the Outstanding Teacher Award, the Moses E. and Mayme Brooks Distinguished Professor Award, the Engineering Research Fellow Awards, the National Alumni Association Distinguished Service Professor Award, the L. R. Hesler Award, and the John Fisher Professorship at UT, the TMS Distinguished Service Award, and a 2020 TMS Symposium dedicated to him. He has been the Director of the National Science Foundation (NSF) Integrative Graduate Education and Research Training (IGERT) Program, the Director of the NSF International Materials Institutes (IMI) Program, and the Director of the NSF Major Research Instrumentation (MRI) Program at UT. Several of his graduate students have been given awards for their research, papers, and presentations at various professional societies and conferences. Moreover, his students teach and conduct research at universities, industries, and government laboratories.