SEMINAR

Professor

Peter K. Liaw

The University of Tennessee

Friday, July 29, 2016
1:00 – 3:00 PM
(including 20 min coffee break)
@Ogata Lab., Toyonaka Campus, Osaka Univ.

Prof. Peter K. Liaw obtained his Ph.D. in Materials Science and Engineering from Northwestern University, USA, in 1980. After working at the Westinghouse Research and Development Center for thirteen years, he joins the faculty and becomes an Endowed Ivan Racheff Chair of Excellence in the Department of Materials Science and Engineering at The University of Tennessee, Knoxville, since March 1993. He has been working in the areas of fatigue, fracture, nondestructive evaluation, and life-prediction methodologies of structural alloys and composites. He has published over five hundred papers, edited twenty books, and presented numerous invited talks at various national and international conferences.

Topics in the seminar

➢ Deviation from High-Entropy Configurations in the $Al_{1.3}CoCrCuFeNi$ Alloy

The alloy-design strategy of combining multiple elements in near-equimolar ratios has shown great potential for producing exceptional engineering materials, often known as “high-entropy alloys”. Understanding the elemental distributions, and, thus, the evolution of the configurational entropy during solidification, are the goal of the present research. The case of the $Al_{1.3}CoCrCuFeNi$ model alloy is examined, using integrated theoretical and experimental techniques, such as *ab initio* molecular-dynamics simulations, neutron scattering, synchrotron X-ray diffraction, high-resolution electron microscopy, and atom-probe tomography. It is shown that even when the material undergoes elemental segregation, precipitation, chemical ordering, and spinodal decomposition, a significant amount of disorder remains, due to the distributions of multiple elements in the major phases. The results suggest that the high-entropy-alloy-design strategy may be used to develop a wide range of complex materials, which are not limited to single-phase solid solutions. The integrated experimental and theoretical techniques, discussed here, are particularly well-suited to studying partially-ordered materials, produced using the high-entropy-alloy design strategy.

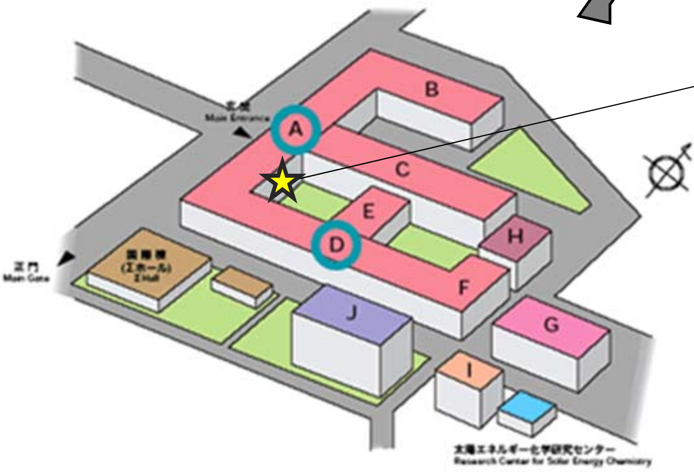
➢ Study of Serrated Flows in Bulk Metallic Glasses and High Entropy Alloys

Bulk metallic glasses (BMGs) and high entropy alloys (HEAs) attract more and more attention for their unique mechanical properties. Recent work suggests that BMGs and HEAs show serrated flows at certain temperatures and strain rates, which is similar to the Portevin–Le Chatelier effect (PLC) in traditional alloys. Therefore, the study of serration behavior could provide a unique way to investigate the deformation dynamics of BMGs and HEAs, and, consequently, to endow us with the fundamental understanding of deformation mechanisms for BMGs and HEAs. In this study, compressive behavior of BMGs and HEAs are characterized statistically, and a new model developed from the mean-field theory is utilized to describe the serrated flows in BMGs and HEAs.

Place: Room A145, School of Engineering Science, Toyonaka Campus, Osaka Univ.

（場所：大阪大学 豊中キャンパス 基礎工学部 A 棟 1 階 A145 室）

School of Engineering Science,
Toyonaka Campus,
Osaka University
（大阪大学 豊中キャンパス 基礎工学部）



Room A145
（A 棟 1 階 A145 室）