Abstract
Laves phase materials have their drawbacks, such as low ductility and extreme brittleness. In order to overcome their weakness and utilize them as structure materials, this research is focused on design of CoNiNb-based eutectic lamella structured alloys consisting of both Laves and Face Centered Cubic (FCC) phase. These CoNiNb-based alloys show superior toughness and good strength at room temperature.

This seminar will feature recent research development of Laves Phase composites and their mechanical properties, including ternary, quaternary and quinary alloys we casted. The fracture toughness tests of these alloys will be introduced, and their nanostructures will be further investigated to explain the improved toughness with the aid of TEM and SEM. Lastly, future research prospects and potential applications of these alloys will be discussed.
About the Speaker
Mr. CHUNG Dukhyun is a PhD student in Department of Mechanical Engineering at City University of Hong Kong. He received his Bachelor degree in Department of Mechanical Engineering at Korea University and Master degree in Department of Structural Engineering at University of Sheffield. His current research interest is Fracture Behaviors of High Entropy Alloys.

Seminar 2: Nano-scale fracture of ultra-thin oxide film on metal surface: A nano-electro-mechanical study

Mr. Tianyu WANG
PhD student
Department of Mechanical Engineering
City University of Hong Kong

Abstract
In this work, a nanoindentation method based on the in-situ nano-electro-mechanical measurement technique was developed to investigate the nano-mechanical behavior of ultra-thin native oxide layer on a metal surface. The composition of the native oxide layer (< 10 nm in thickness) on the surface of the Cu$_{30}$Zr$_{70}$ metallic glass thin film was first characterized using X-ray Photoelectron Spectroscopy (XPS). After that, the in-situ nano-electro-mechanical experiments were carried out with a sharp nano-indenter, which showed the abrupt increase in the electric current flowing through the tip of the nanoindenter into the film when the breakage of the ultra-thin oxide film took place. Inspired by this phenomenon, a nano-mechanical model for the oxide film breakage was developed considering a membrane stretching effect, which enables the measurement of the fracture stress in the ultra-thin oxide layer. The outcome of our current research is important, which should be very useful to a variety of applications related to the formation and growth of surface oxides, such as corrosion resistance of metallic glasses and the development of high temperature alloys.
About the Speaker

Mr. WANG Tianyu is a PhD student from Department of Mechanical Engineering at City University of Hong Kong. He received his Bachelor degree (2017) from Department of Modern Mechanics at University of Science and Technology of China. His current research interest is fabrication and characterization of multicomponent metal thin films.

All are Welcome!

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