ASM INTERNATIONAL

San Diego Chapter

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February 2020

Thursday, February 27th, 2020

Prof. Kenneth Vecchio of UC San Diego will be hosting

ASM International President Dr. Zi-Kui Liu

The topic of the presentation is

"Materials Genome® and Materials Design"

Materials are enablers of our civilization as evidenced by three-age division of the prehistory and protohistory of humanity and development of advanced materials for modern technologies that enhance our daily life and impact our exploration of the universe. Historically materials have been discovered and developed through the trial and error Edisonian approach to develop processing-property relationships. This empirical approach is shifting towards the design of materials, driven by the advancement of our knowledge and computing capability. The concept of Materials Genome® concerns the building blocks of materials, usually considered to be the individual phases, and the materials design thus centers on obtaining the desired phases and their spatial arrangement, i.e. microstructures, through the combination of chemical compositions and processing parameters. Thermodynamics is a science concerning the states of a system, largely represented by its phases, when interacting with the surroundings. Thermodynamic modeling based on the CALPHAD method and first-principles calculations enables the applications of thermodynamics for materials design. In this presentation, some examples on the chemistry and processing design of thin film growth of oxides, nanograined metallic alloys, and additively manufactured functionally graded materials will be discussed along with our newly developed tools for thermodynamic modeling using machine learning approaches. Our activities on thermodynamic instability and the associated emergent behaviors will also be presented in terms of INVAR and the internal structures of $PbTiO_3$.

Dr. Zi-Kui Liu is a Fellow and President of ASM International. He was a member of the TMS Board of Directors and a member of Board of Trustees of ASM International. He received the ASM J. Willard Gibbs Phase Equilibria Award, the TMS William Hume-Rothery Award, the ACers Spriggs Phase Equilibria Award, the Wilson Award for Excellence in Research from the Pennsylvania State University, and the Lee Hsun Award from Institute of Metals Research, Chinese Academy of Science. Dr. Zi-Kui Liu is a distinguished professor in the department of Materials Science and Engineering at The Pennsylvania State University. He was a senior research scientist at Questek Innovation, LLC. He is the Editor-in-Chief of CALPHAD, and the President of CALPHAD, Inc. since 2013. Dr. Liu coined the name "Materials Genome®" in 2002 and his company, Materials Genome, Inc., owns its trademark.

Location: Structural and Materials Engineering Building
Times: Social Hour & Dinner 6:00 to 7:00 pm, Presentation 7:00 PM
Cost: Presentation is Open & Dinner $5.00 **For Dinner You Must RSVP by Fri., Feb 21st.**

RSVP through: Klug_Robert_C@Solarturbines.com