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Materials Science and Engineering

UNIVERSITY OF CENTRAL FLORIDA

MATERIALS SCIENCE & ENGINEERING DISTINGUISHED SEMINAR SERIES

Novel Ceramic-Metal Composites with Hierarchical Microstructures



Dr. Helen M. Chan

Department of Materials
Science & Engineering
Lehigh University
Bethlehem, Pennsylvania

**Friday
May 5, 2017**

11:00AM – 12:00PM

**Harris Corporation
Engineering Center
Room 101**

*Light refreshments
will be served*

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Unique microstructures, comprising interpenetrating mixtures of metallic and ceramic phases can be fabricated by the controlled reduction of complex oxides of the type $M^I M^II O_{x+y}$. The less stable oxide is selectively reduced, leaving the metal (M^I) and the other oxide ($M^II O_y$). Research at Lehigh has demonstrated that $CuAlO_2$ (delafossite) and $CoTiO_3$ are highly amenable to this approach. The resulting microstructures are novel, and not achievable by conventional processing starting with the constituent metal and ceramic phases. In the case of $CuAlO_2$, partial reduction gives rise to a composite composed of two-phase copper - alumina regions of vastly differing length scales, which span the range from nanometers to microns. HRTEM and Cs-corrected high-angle annular dark field (HAADF)-STEM imaging were used to study partially transformed samples, and hence elucidate the transformation mechanism. The talk will discuss the above findings, together with strategies for microstructural design of the composites. Preliminary results on the mechanical characterization of the composites by micro-cantilever beam testing will also be presented.

Biography: Dr. Helen M. Chan graduated from Imperial College (London) with a B.Sc. First Class Honours degree in Materials Science. She was subsequently awarded a Ph.D. and D.I.C. from the same institution. Dr. Chan joined the faculty of the Dept. of Materials Science & Engineering, Lehigh University, in 1986. She subsequently spent 18-months at the National Institute of Standards and Technology, where she worked in the Mechanical Properties Group of the Ceramics Division. She was promoted to Full Professor in 1995, and currently holds the New Jersey Zinc Chair. Dr. Chan served as Chair of the Materials Science & Engineering Department from 2006 - 2016.

Dr. Chan is the author of more than 180 publications, and is included in Thomson ISI's list of highly cited researchers (Materials). She has received the American Ceramic Society Roland B. Snow award on four separate occasions (1986, 1990, 1992, and 1999), and in 1990 was awarded the Alfred Noble Robinson Award for "outstanding performance and unusual promise of professional achievement". Dr. Chan received Lehigh University's "Service Teaching Excellence Award" for 1991 and 1992, and was named the 1992 recipient of ASM International's Bradley Stoughton Award for outstanding young faculty in the field of Materials Science & Engineering. She is a Fellow of the American Ceramic Society, and chaired the 2008 Gordon Research Conference in Solid State Ceramics. Dr. Chan is a past Chair of the Basic Science Division of the American Ceramic Society. Most recently, Dr. Chan was the recipient of a Fulbright Award and in Fall 2016 served as a Fulbright Visiting Professor at FELMI-TU Graz, Graz, Austria.

For further information please click link below:
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