THE 2011 MORRIS E. FINE LECTURE

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"Integrated Computational Materials Engineering (ICME): *The Next Big Thing in Materials* "

A new field of study is evolving within the materials profession called Integrated Computational Materials Engineering (ICME). ICME has been defined as "the integration of materials information, represented in computational tools, with engineering product performance analysis and manufacturing-process simulation" (1). It promises to revolutionize the way the materials community provides input to the engineering and scientific communities. It involves development of unified materials models which integrate information across length and time scales and across knowledge domains and enables integration of analysis of manufacturing, design and materials into a holistic system. In addition to increasing the efficiency of the engineering process, ICME has significant potential for accelerating development of new materials. The talk will draw on the presenter's experience at Ford Motor Company in development and implementation of a successful ICME tool called *Virtual Aluminum Castings*. *VAC* is a comprehensive, integrated and validated suite of computational tools for optimization of cast aluminum components and manufacturing processes. The talk will provide an overview of the quantitative process-structure-property relationships for cast aluminum alloys that form an essential element of VAC. The talk will also draw from a National Academies report on ICME (1) and other events such as the recently announced Materials Genome Initiative to make the case that ICME represents the Next Big Thing in Structural Materials.

1.Tresa M. Pollock, John E. Allison, Daniel G. Backman, Mary C. Boyce, Mark Gersh, Elizabeth A. Holm, Richard LeSar, Mike Long, Adam C. Powell, IV, John J. Schirra, Deborah Demania Whitis, Christoper Woodward, "Integrated Computational Materials Engineering: A Transformational Discipline for Improved Competitiveness and National Security", The National Academies Press, 500 Fifth Street, N.W. Washington, DC 20001, 2008.

BIO: John E. Allison is a Professor of Materials Science and Engineering in the College of Engineering at The University of Michigan. He joined the faculty in September 2010. Prior to that he was a Senior Technical Leader at Ford Research and Advanced Engineering, Ford Motor Company in Dearborn, Michigan, where he was for 27 years. At Ford he led teams developing Integrated Computational Materials Engineering (ICME) methods, advanced CAE tools and light metals technology for automotive applications. His experience includes service as an officer in the US Air Force at the Wright Aeronautical Laboratories, a Visiting Scientist at the Brown-Boveri Corporate Research Center in Baden Switzerland and a Visiting Researcher at Monash University in Melbourne Australia. He has over 160 publications and 5 patents. Dr. Allison was the 2002 President of The Minerals, Metals and Materials Society (TMS) and served on the US National Materials Advisory Board from 2001-2007. He is a member of the National Academy of Engineering, a Fellow of ASM and has received numerous awards including two Henry Ford Technology Awards. He is also an Honorary Professor at the University of Science and Technology Beijing and a Guest Professor at Shanghai JiaoTong University. Dr. Allison received his PhD in Metallurgical Engineering and Materials Science from Carnegie-Mellon University, his MS in Metallurgical Engineering from The Ohio State University and his BS in Engineering Mechanics from the US Air Force Academy.

October 25, 2011
Tech L 211, 4:00pm
Reception-Cook Atrium, 5:00pm