

Title **Discovering the relationship between evolved microstructure and mechanical properties**

Speaker Prof. Ian M. Robertson
Dean, College of Engineering, University of Wisconsin-Madison, US



Time & Date 9:00 AM(JST), Wednesday, January 13th, 2021

Abstract

The behavior and properties of dislocations in metallic systems are assumed to be well understood. Based on this assumption, relationships between dislocation structures, fracture events and mechanical properties have been proposed. However, recent advances in experimental methods have provided an opportunity to explore at the nanoscale the dislocation microstructure that resides immediately ahead of propagating cracks as well as beneath fracture surfaces. The observed microstructures exhibit a degree of complexity not envisioned by our past a posteriori analysis approach. These findings have significant implications as to the suitability and applicability of conventional interpretations imbedded in the decohesion vs. HELP approach for predicting and assessing hydrogen-induced failures of metallic systems.

In this talk, I will demonstrate how the microstructure evolves under different loading conditions and environments. In particular I will establish that, contrary to previous assumptions, plasticity does play a deterministic role in environment-induced intergranular failure. The findings have significant ramifications for physically-based models of mechanical properties as well as alloy design.

About the Speaker

Dr. Ian Robertson joined the University of Wisconsin-Madison in 2013 as the Dean of the College of Engineering. Prior to this he was the Donald B. Willett Professor of Engineering in the Department of Materials Science and Engineering at the University of Illinois and served as Head of the Department from 2005-2009. From 2011 to 2013 Dr. Robertson served as the Director of the Division of Materials Research at the National Science Foundation.

He received a B.Sc. degree (first class) in Applied Physics from Strathclyde University, Glasgow Scotland in 1978 and his D.Phil (Metallurgy) from the University of Oxford in 1982.

His insight to the mechanisms responsible for hydrogen embrittlement of metals was recognized by the Department of Energy in 1984 when he received the DOE prize for Outstanding Scientific Accomplishment in Metallurgy and Ceramics. In 2011, he received the DOE EE Fuel Cell Program award for contributions to our understanding of mechanisms of hydrogen embrittlement. He was selected as the 2014 recipient of the ASM Edward DeMille Campbell Memorial Lectureship. He has been the Editor-in-Chief of the review journal Current Opinion in Solid State and Materials Science since 2009. He has been elected a Fellow of the ASM International, American Association for the Advancement of Science, The Minerals, Metals & Materials Society, and the Materials Research Society.

Registration

<https://zoom.us/meeting/register/tJYudu2hrjMuGtIYSSz0poDOCobBtW2LTMqe>

Host Prof. Masanobu Kubota

Contact I²CNER · Q-PIT Office of Research Support Services,
Research Support and Public Relations
TEL: +81 92 802-6935
Email: iq-kenkyu@jimu.kyushu-u.ac.jp

