

DEPARTMENT OF MECHANICAL ENGINEERING

COLLOQUIUM SEMINAR SERIES



Investigating Electromigration Using X-Ray Microbeam Diffraction Coupled with Modeling and Simulation

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Electromigration is a mass transport process that occurs in metal interconnects when a high electrical current density is applied. If the interconnect is not sufficiently confined, the diffusion process may continue until a void forms at the cathode end, eventually leading to failure. If the interconnect is confined, the mass transport due to electromigration eventually leads to a build-up of a stress gradient with a diffusion driving force that is equal and opposite to that due to the high current density, and the mass transport is arrested. The push for increased performance and continued miniaturization in microelectronic devices leads to higher current densities that are more likely to cause electromigration induced failure. An inverse problem solving approach combining modeling and simulation coupled with X-ray microbeam studies, where local elastic strains are measured, can be used to resolve some of the challenging questions regarding the physics of electromigration. This talk presents a finite element based inverse problem formulation, which is used with two X-ray microbeam data sets, exhibiting opposing trends, to demonstrate how some key questions about electromigration may be answered.

After receiving her B.S. degree in Mechanical Engineering with highest honors from Rensselaer Polytechnic Institute in 1987, **Antoinette Maniatty** went on to earn an M.S. degree in Mechanical Engineering from the University of Minnesota in 1988 followed by a Ph.D. from Cornell in 1991. After spending one year as a Visiting Lecturer at the University of Natal in Durban, South Africa, she joined the faculty at Rensselaer in 1992. She was the Clare Boothe Luce Assistant Professor from 1992-1997. She was one of four women scientists and engineers nationwide to be awarded a Luce fellowship by the Luce Foundation in 1992. In 1993, she received a National Science Foundation Young Investigator Award. She was a member of the Defense Science Study Group in 2000 and 2001. In 2001, she was the first Loewy Visiting Professor in the Materials Science and Engineering Department at Lehigh University. In 2005, she was named a Fellow of the ASME. Maniatty is a member of the ASME, SME, ASM, ASEE, Tau Beta Pi, Pi Tau Sigma, and Sigma Xi.

DATE: Tuesday, February 26, 2012

TIME: 2:00 - 3:00pm

LOCATION: Macdonald Engineering Building, RM 267



McGill