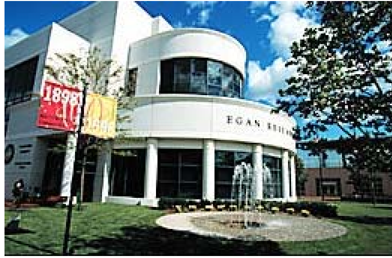
NU Mechanical and Industrial Engineering Colloquium Series – Spring 07
FRIDAY March 2, Egan Research Center 306



SEMINAR TITLE

"Damage Mechanics of Next Generation Nano Electronics Packaging"

SEMINAR SPEAKER

Cemal Basaran
Professor and Director
Electronic Packaging Laboratory
Department of Civil Structural and
Environmental Engineering
SUNY at Buffalo,
Buffalo, NY

PROGRAM

10:45 - 11:00 a.m. Tea, Coffee and Treats
11:00 - 11:45 p.m. Lecture (typical)
11:45 - 12:00 p.m. Q&A and Discussion

ABSTRACT

Insatiate demand for miniaturization of electronic devices down to nano-scale makes electromigration and thermomigration a major concern. Electromigration and thermomigration, are irreversible mass diffusion under high current density, and high temperature gradient, respectively. In this work thermodynamics, statistical mechanics and mass transport (diffusion) principals are used to model electromigration and thermomigration induced damage in solder joints subjected to high current densities. Electromigration process is modeled by the atomic vacancy flux process. Entropy production in the system is used as damage metric. The irreversible thermodynamic damage model utilized in this work has previously been successfully used to model thermo-mechanical fatigue life of microelectronic solder joints. In this work we extend this model to electromigration-induced degradation. The proposed unified model is compared with several existing empirical models and test data.

BIOGRAPHIC PROFILE

Cemal Basaran is Professor and Director of Electronic Packaging Laboratory at the State University of New York at Buffalo, www.packaging.buffalo.edu.

He specializes in experimental and computational damage mechanics of Nano and power electronics packaging. He has authored more than 130 publications in the field of electronics packaging, high sensitivity moiré interferometry and thermodynamics based damage mechanics. He holds a MS degree in Civil Engineering from MIT and a PhD in Engineering Mechanics from the University of Arizona in Tucson. He is 1997 recipient of the Department of Defense ONR Young Investigator Award. He is the Assoc. Editor of ASME Journal of Electronic Packaging, IEEE Trans. on Advanced Packaging and the Regional Editor for Americas for Int. J. of Materials and Structural Integrity.

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