Latest Developments in Failure Modeling of Electromigration and ILD TDDB

James R. Lloyd
SUNY Albany CNSE
251 Fuller Road
Albany, NY 12203
USA
tel:518-956-7062
jlloyd@uamail.albany.edu

Recently there has been some progress in the modeling of both electromigration and TDDB for low-k interlevel dielectrics that may impact how these problems are dealt with in engineering. For electromigration, the concept damage nucleation and growth provides both a more satisfying conceptual framework as well as a more logical method to project lifetimes from test to use conditions than the classical Black Model (n=2) or the modified Black model (which has serious conceptual problems) In addition, the time dependent dielectric breakdown (TDDB) in low-k interlevel dielectrics (ILD) has been shown to behave quite differently than SiO_2 based dielectrics. Here we have seen that several "root-E" models provide a better fit to the empirical data than the classic but controversial E or 1/E models. These new models will be described and compared with the traditional methods and the physical interpretations discussed in detail.

Jim Lloyd

Professor of Nanotechnology at SUNY Albany College of Nanoscale Science and Engineering (CNSE). Dr. Lloyd has had a nearly 35 year career in industrial reliability research with IBM, Digitial Equipment Corporation, Jet Propulsion Laboratory and Max-Planck Institute for Metallforschung, as well as a few years as an independent consultant. At this time he is forming a reliability center at CNSE dedicated to reliability research in a variety of areas. Dr Lloyd also likes airplanes and welds junk together.