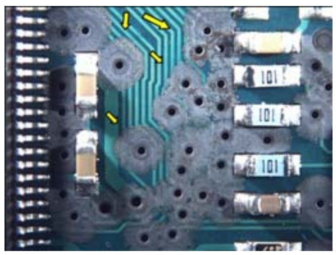
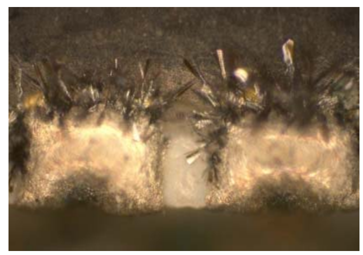
Providing Robust Corrosion Resistant Electronics

Michael Osterman
(301) 405-8023
osterman@umd.edu
Center for Advanced Life Cycle Engineering

As electronic products find their way into a wider number of applications and operators of electronic equipment seek to reduce costs and energy use, electronic assemblies are experiencing corrosive environment which can lead to failure. Further the introduction of new materials and modification of assembly processes to accommodate these new materials can introduce or expose failure mechanisms to which earlier product generations were immune. For example, silver sulfide formation induced failure in chip resistors appears to be linked the RoHS conversion. In addition, creep corrosion of immersion silver finished printed wiring assemblies is another example of a material change that resulted in field failures.



Creep Corrosion on PWB



Silver Sulfide Formation of Chip Resistor

To protect electronics against corrosion based failures, a variety of standard tests have been developed. The most common being the mixed flowing gas test developed by Battelle Labs and codified in ASTM B845-97(2013) and IEC 60068-2-60. However, recent failure escapes such as the two previously identified, have industry looking for new tests or repurposing existing tests. New tests include the “clay test” which was used to expose the creep corrosion failure. An example of the repurposed tests is the ASTM B809 Flowers of Sulfur, originally used to assess gold plating porosity, now used to expose the silver sulfide formation failure.

This presentation will review many of the corrosion susceptibility test, It will recent finding from form these tests. It will discuss corrosion based failure of electronic equipment and test methods used to establish corrosion resistance.

About Presenter: Michael Osterman (Ph.D., University of Maryland, 1991) is a Senior Research Scientist and the director of the CALCE Electronic Products and System Consortium at the University of Maryland. He heads the development of simulation assisted reliability assessment software for CALCE and simulation approaches for estimating time to failure of electronic hardware under test and field conditions. He has consulted with automotive, medical, defense, and industrial electronic companies on the transition to lead-free materials. He organized and chaired the International Symposium on Tin Whiskers from 2007 to 2013. He has written eight book chapters and over 120 articles. He is a senior member of IEEE and a member of ASME, IMAPS and SMTA.