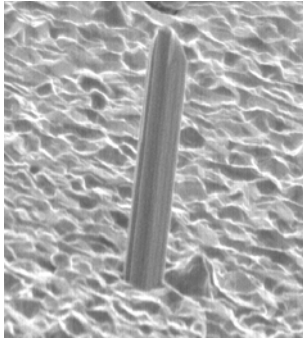


Whisker formation in Sn films on Cu

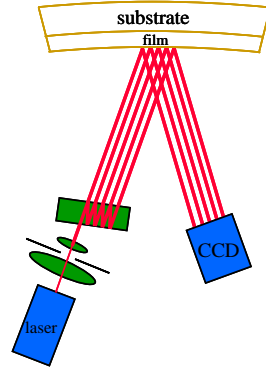
E. Chason and K.S. Kumar

Problem: Sn-Pb alloy coatings are commonly electroplated on Cu conductors to prevent oxidation and enhance solderability. New environmental regulations require elimination of all Pb in electronics manufacturing. Pure Sn coatings without Pb develop whiskers that can cause short circuits (such whiskers are responsible for the crash of a Galaxy IV satellite and many other documented system failures).

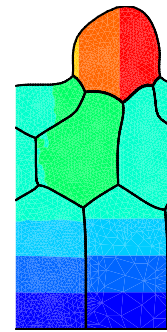


Whisker on Sn surface

Approach: We are collaborating with EMC Corporation, a manufacturer of high reliability data storage systems, to understand the processes controlling whisker formation. We have developed a suite of real-time diagnostics to monitor stress, intermetallic compound (IMC) formation and whisker growth in order to understand the driving forces for whisker formation, develop mitigation schemes and assess the reliability of alternative coatings.

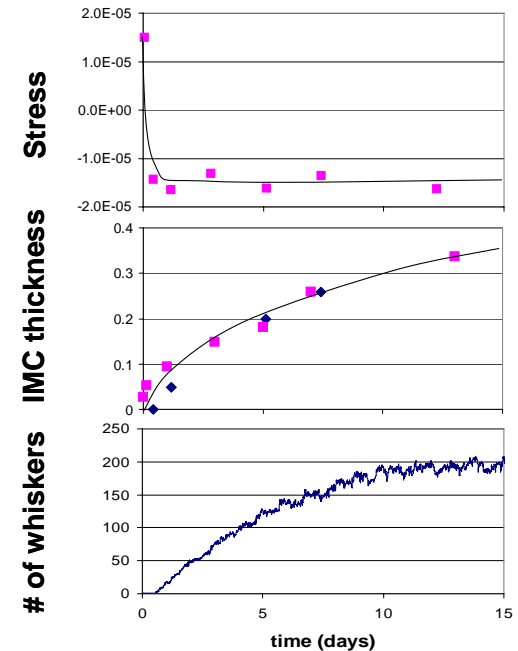


MOSS system for measuring film stress



FEM modeling of whisker formation

Results: We have measured stress, intermetallic growth and whisker nucleation kinetics on Sn films to determine critical stress for whisker formation. The experimental results are being used to develop quantitative models.



Simultaneous measurement of stress, intermetallic volume and whisker density on Sn films.