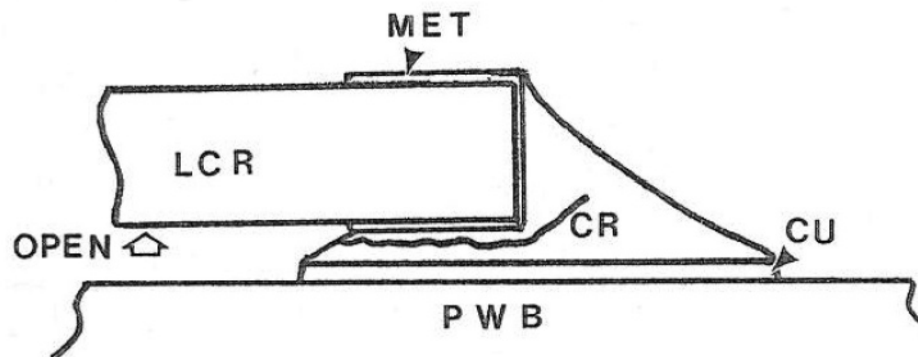
Thermomechanical Fatigue of Solder Interconnects in Automotive Electronics

ΔT = -40 to 125°C

- $\Delta\sigma$ due to CTE mismatch
- permanent deformation of solder by diffusional creep
- formation of vacancies at grain boundaries
- growth of vacancies into microcracks or voids
- fatigue crack initiation and propagation



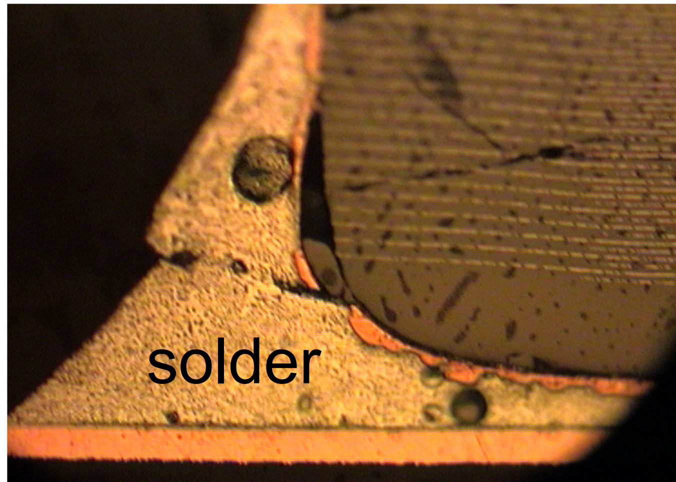
Liu and Pao, *J. Electr. Mater.*, **26** [9] 1058-1064 (1997)

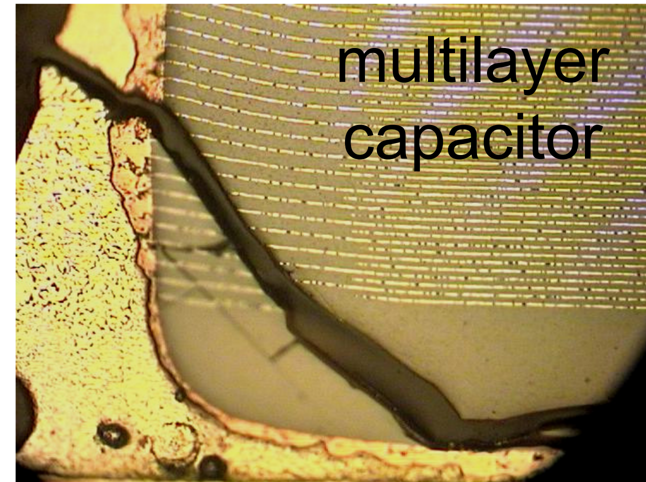
Thermomechanical Fatigue of Solder Interconnects in Automotive Electronics

Accelerated laboratory tests simultaneously cycle T and four point bending strain on the circuit board

$\Delta T = -50 \text{ to } 150°C$

$\Delta\varepsilon = \pm 1000\ \mu\varepsilon$





Torres-Montoya and Mason, 2003