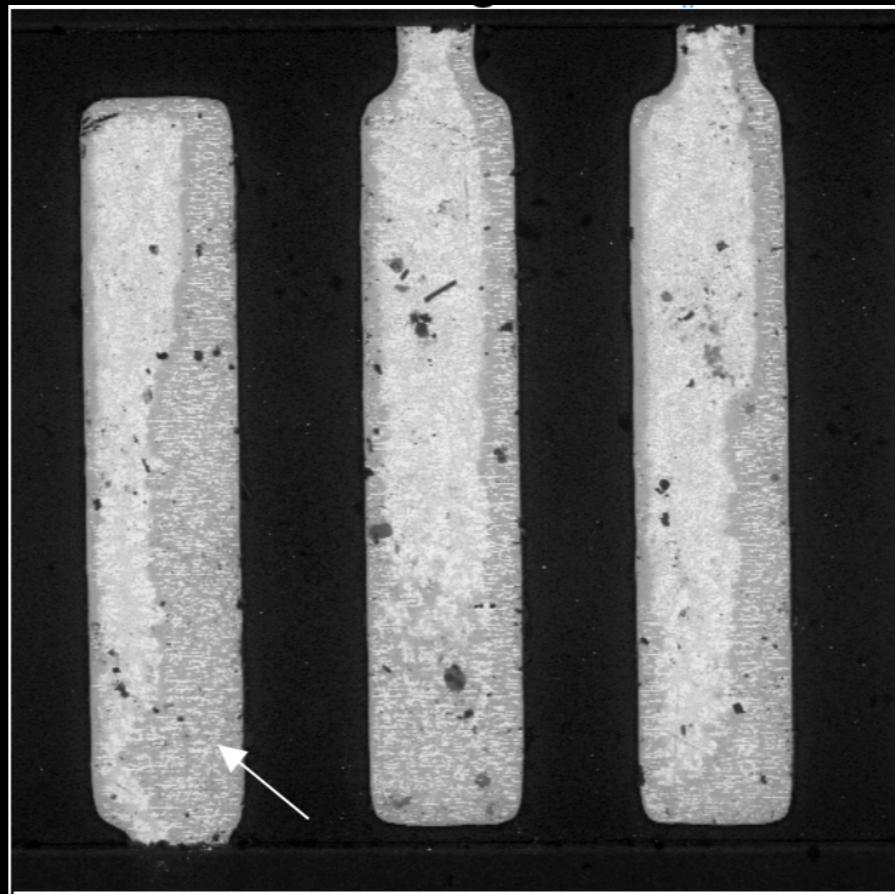


# HASL Finish on PWBs

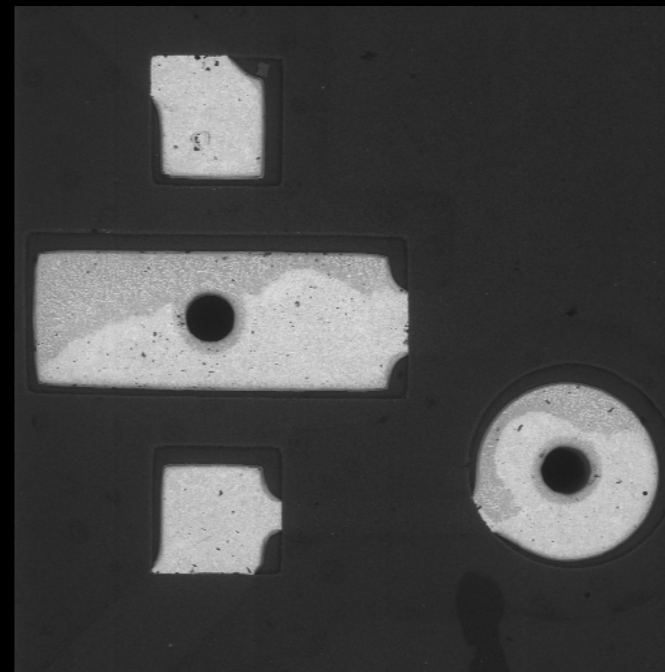
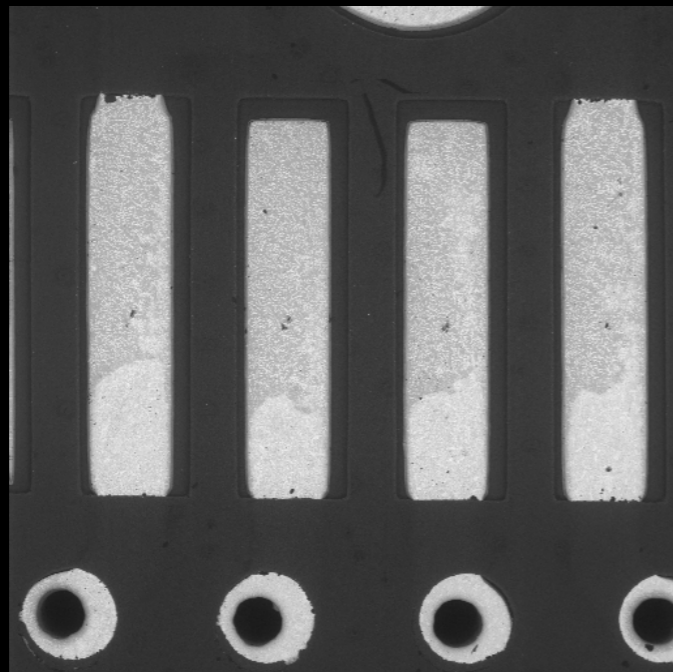
[www.semlab.com](http://www.semlab.com)



## BSE SEM image of Sn-Pb HASL finish

Poor quality HASL finishes on PWBs can cause severe solderability problems during reflow soldering. Exposed copper-tin IMC (arrow) oxidizes and becomes very difficult to wet during reflow.

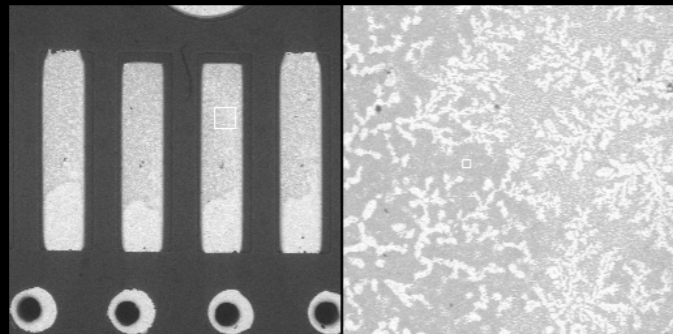
# Poor Sn-Pb HASL



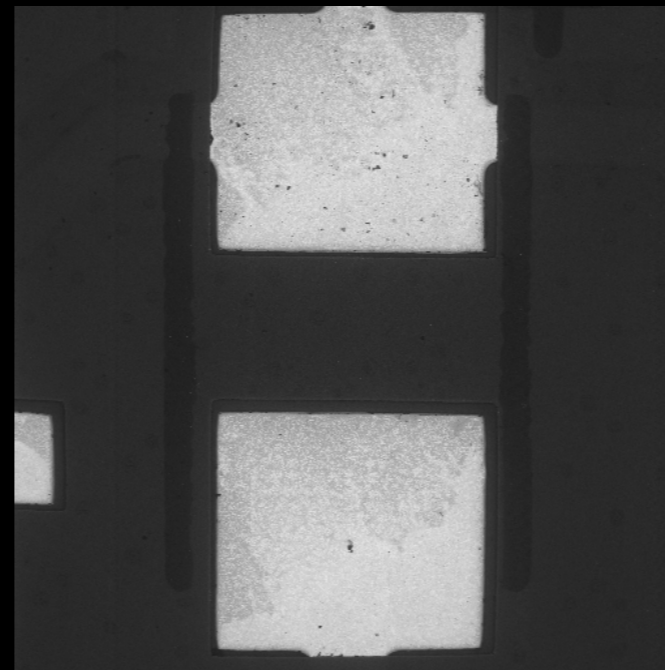
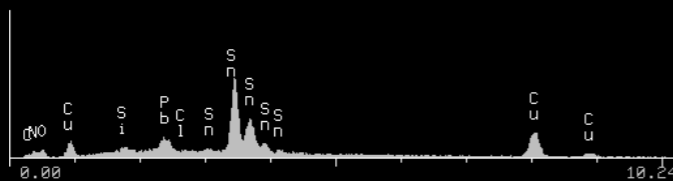
## Possible Factors

- knife air pressure
- plated copper solderability
- solder pot temperature
- velocity of extraction from solder pot

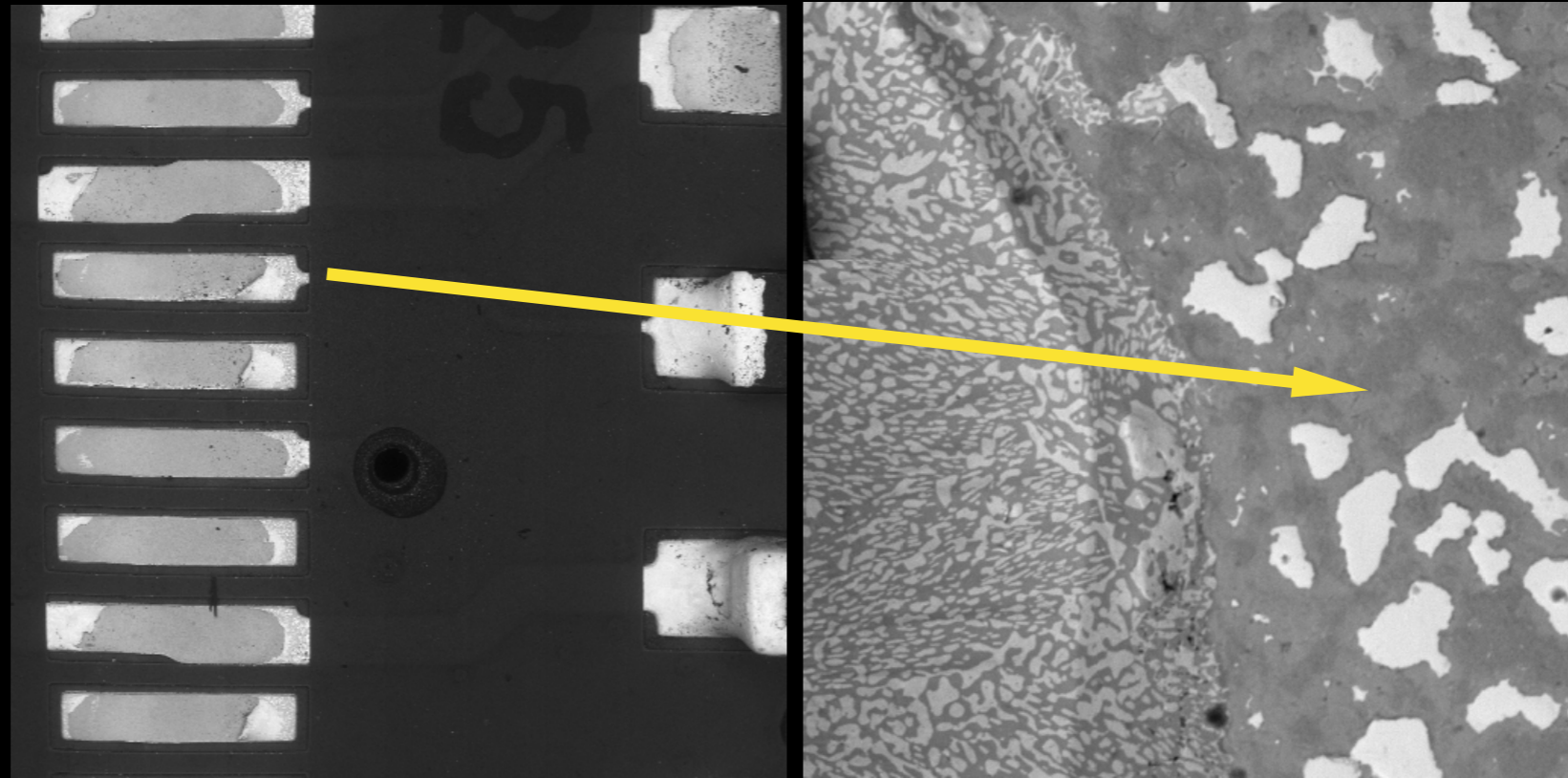
Personal SEM V4.021 Nov 7, 2002 SEM Lab, Inc.  
25X 1.0 mm 15.0 kV 20 mm 30.1% spot



DT=14% CPS=1003 FD=100 LT=100 400X H 10 um  
VFS=2093 (manual) X= 94 Y=121 I=198



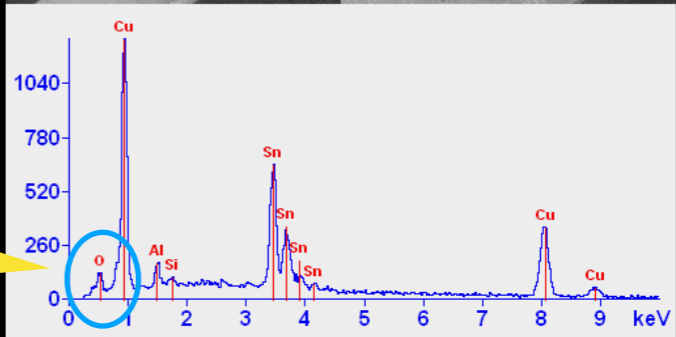
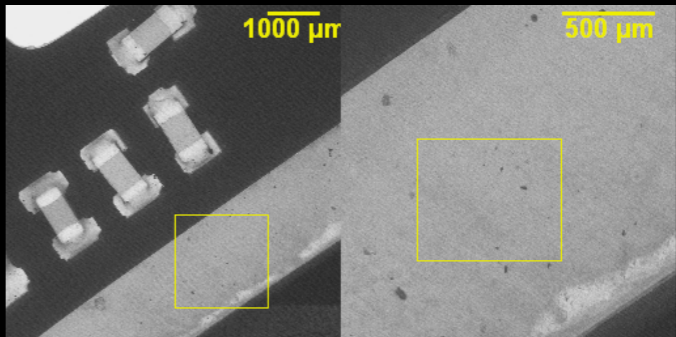
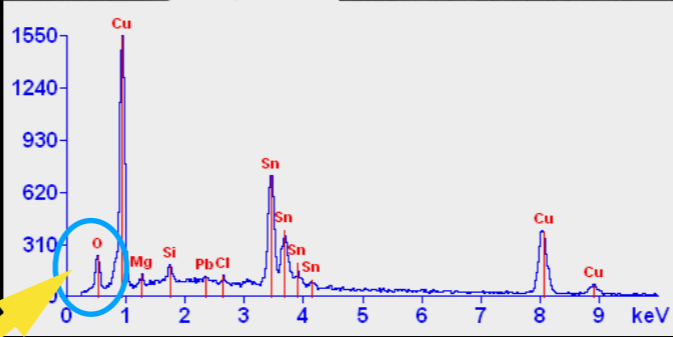
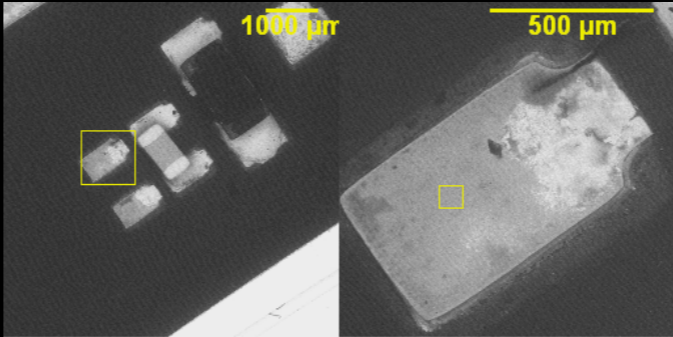
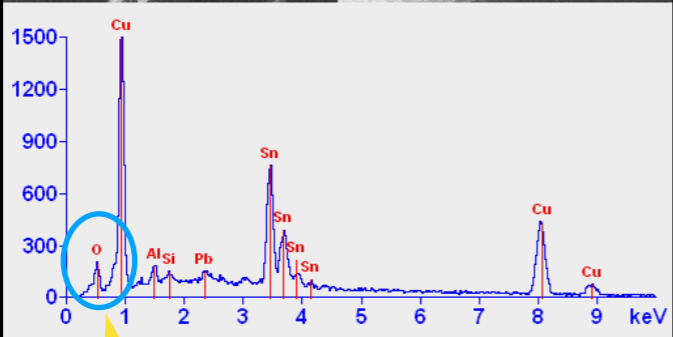
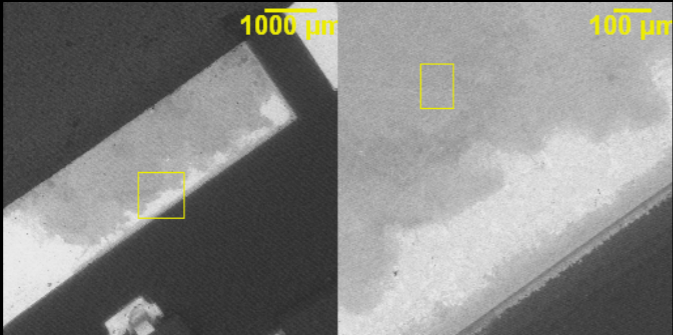
# What could possibly go wrong?



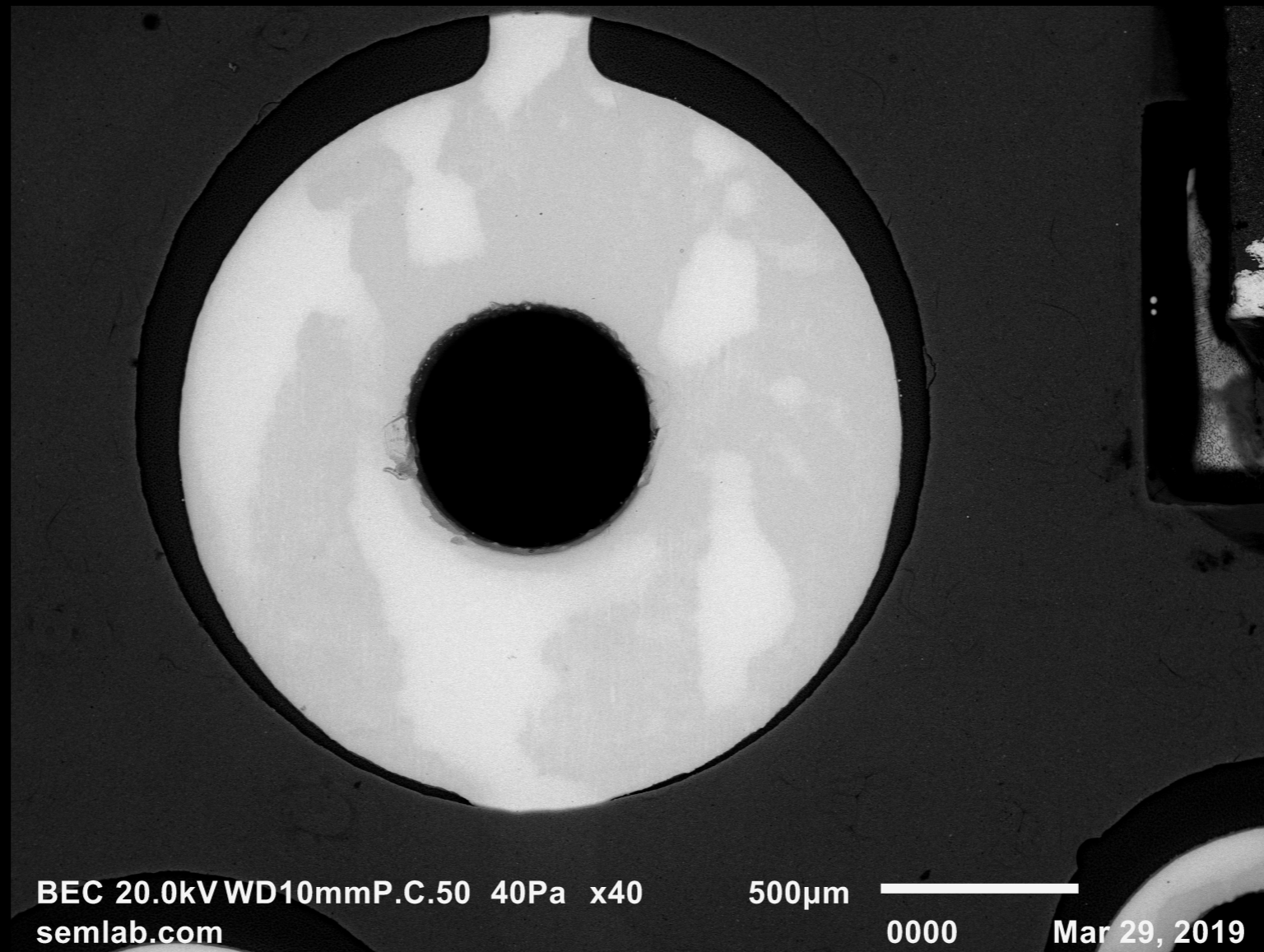
SMT connector leads failed in a brittle interfacial fracture mode during shock & vibration tests

Non & dewetted areas at the corners of the pads show oxidized Cu-Sn IMC typically caused by bad HASL on the PWBs

# Exposed Cu-Sn intermetallic is readily oxidized



Oxidized



Lead Free HASL has the same issue as Sn-Pb HASL

# Recommendations

- **Check HASL finished PWB coupons/bare boards on new board lots**
- **SEM/EDS, microsections, and XRF are appropriate techniques**
- **Know that optical inspection can miss this type of condition**

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