

## APPLICATION BRIEF

**SMI no.7 Whiskers on copper frames with lead-free plating /  
Structural analysis of substrate interfaces**

2007.8

**1. Introduction**

Short circuit-causing whiskers are becoming a serious problem as the use of lead-free parts in electronic devices rapidly progresses. To improve the reliability of these devices, the whisker phenomenon must be viewed from various perspectives and the way that whiskers are produced must be clarified. In this brief, a focused ion beam is used to prepare an electron backscattering pattern (EBSP) sample of a tin whisker on lead frames.

**2. Processing method**

The whisker shown in Figure 1 was cut off using a FIB and microprobing system. The whisker was then placed on a TEM observation mesh.

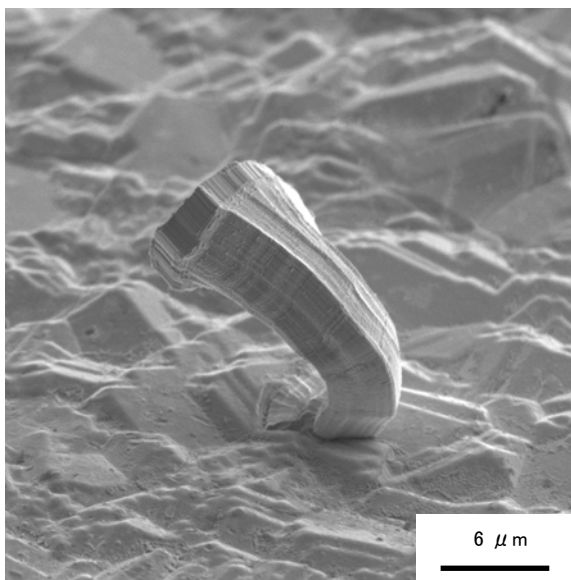


Figure 1. Whisker

Next, the whisker was cut using FIB to obtain a flat cross-section. Figure 2 shows the cross-section of the whisker.

The crystal orientation of this sample was analyzed using the EBSP method. The electron diffraction pattern confirmed that the whisker was a single crystal. Figure 3 shows these results.

**3. Conclusion**

A focused ion beam was used to prepare an EBSP sample of a tin whisker on a lead frame. Crystal orientation analysis showed that the whisker was a single crystal with high crystallinity. This brief confirms that focused ion beams can be used to easily prepare EBSP samples.

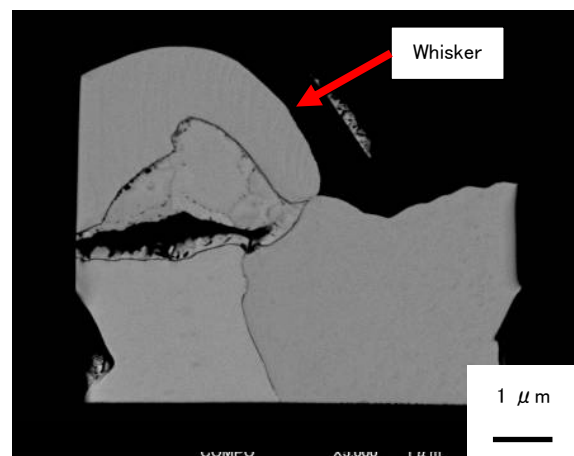


Figure 2. SEM image of FIB cross-section

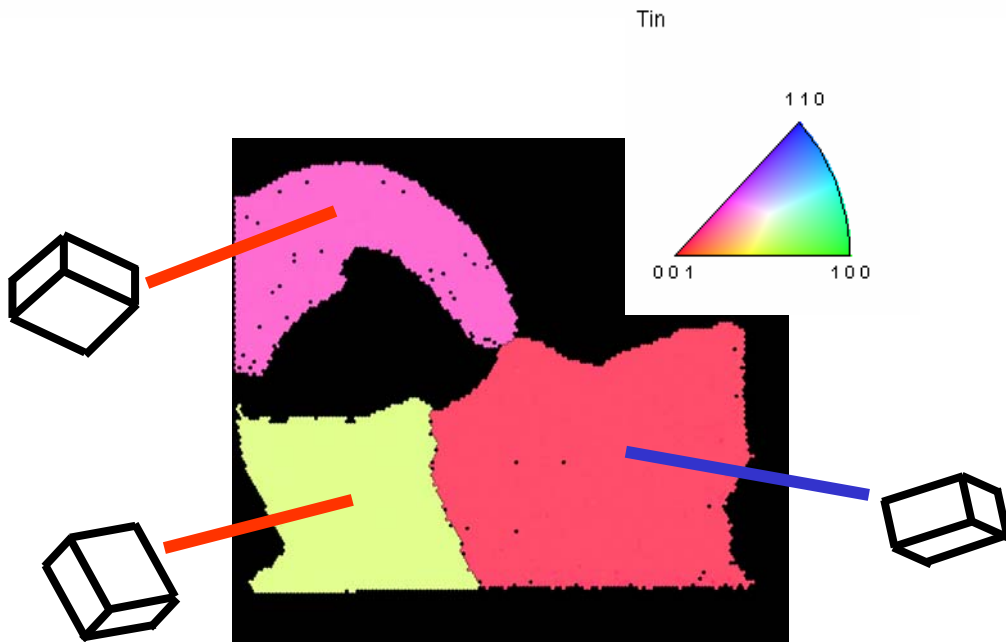


Diagram 3 – EBSD analysis of crystal orientation