# Orientation Imaging Microscopy (OIM) Applications in Cu- Interconnects and Cu-Cu Wire Bonding

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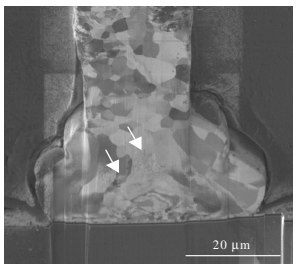
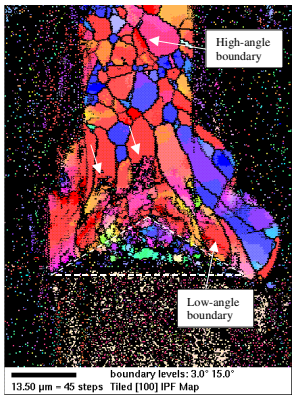
**Orientation Imaging Microscopy (OIM) is a fully automated Electron Back-Scattered Diffraction (EBSD) technique. During the measurement, an electron beam scans the sample in a standard Scanning Electron Microscope (SEM). At each point, a unique back-scattered Kikuchi pattern is produced and collected by a low-light camera towards which the sample is tilted. This pattern, after being indexed, determines the crystallographic orientation at each point.**
**The signal is sensitive to surface contamination layers and therefore does not give good results for polished Cu samples. FIB is applied to remove this contamination layer.**




**FIB image of the cross-section of a Cu wire bond prepared by polishing and FIB milling.**




**<111>**
**<100>**
**<110>**

**OIM image of the wire bond cross-section. A deformation concentration can be noticed (dashed line triangle). Thick lines are used for high angle grain boundaries (>15º) and thin lines- for low angle boundaries (<15º). The arrows point on the contamination visible on the FIB image.**

**Two types of grain morphologies are observed: smaller, equiaxed grains in the wire and larger, elongated grains in the wire ball area. This type of grain morphology is also observed in Cu balls before bonding and depends on the ball formation conditions.**
**At the interface with the bond pad, there is an area (see the dashed lines triangle), where the EBSD signal deteriorates strongly and is partially filtered out by the data treatment procedure. This deterioration is caused by a very high dislocation density, which leads to a loss of EBSD pattern.**

More details : "Orientation Imaging Microscopy (OIM) Applications in Cu-Interconnects and Cu-Cu Wire Bonding", Petar Ratchev, Laureen Carbonell, Hong Meng Ho, Hugo Bender, Ingrid De Wolf and Bert Verlinden, to be published in Proc ISTFA2002.