



## AN 221 Surface Metal Contamination on Patterned Wafers

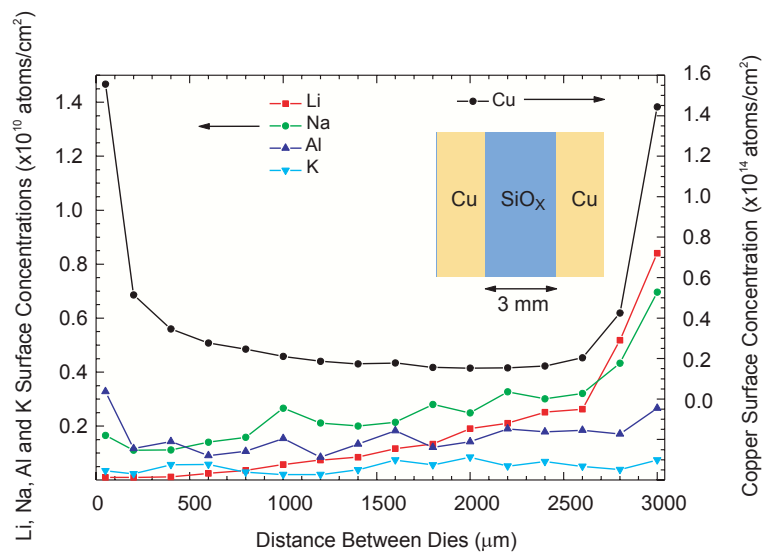
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### Discussion

The measurement of surface metal contamination during device fabrication is increasingly important as technology advances and new materials are developed. Metal contamination measurements on unpatterned wafers are typically done by TXRF (Total Reflection X-Ray Fluorescence Spectroscopy). However, the large analytical area required by TXRF makes it impossible to analyze specific regions on a patterned wafer.

TOF-SIMS (Time-of-Flight Secondary Ion Mass Spectrometry) is a viable alternative that allows surface metal contamination to be determined, both on blanket and patterned wafers. The following figure shows the Li, Na, Al, K and Cu concentrations on the field oxide between two copper structures separated by 3 mm.

These measurements can be extremely useful for investigating the performance of CMP or assessing the efficiency of a post-CMP clean. In this case, it can be seen that the Cu concentration was highest near the two dies, and lowest in between them. Other species such as sodium and lithium show a systematic increase from one die to the other. This type of data can then be used to optimize a process or may be cross correlated with electrical test data.



Surface metal concentrations on the field oxide between two copper structures. The data were acquired from 80 μm squares separated by 200 μm

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