AN 368
Whole Wafer Analysis Using TOF-SIMS

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Discussion

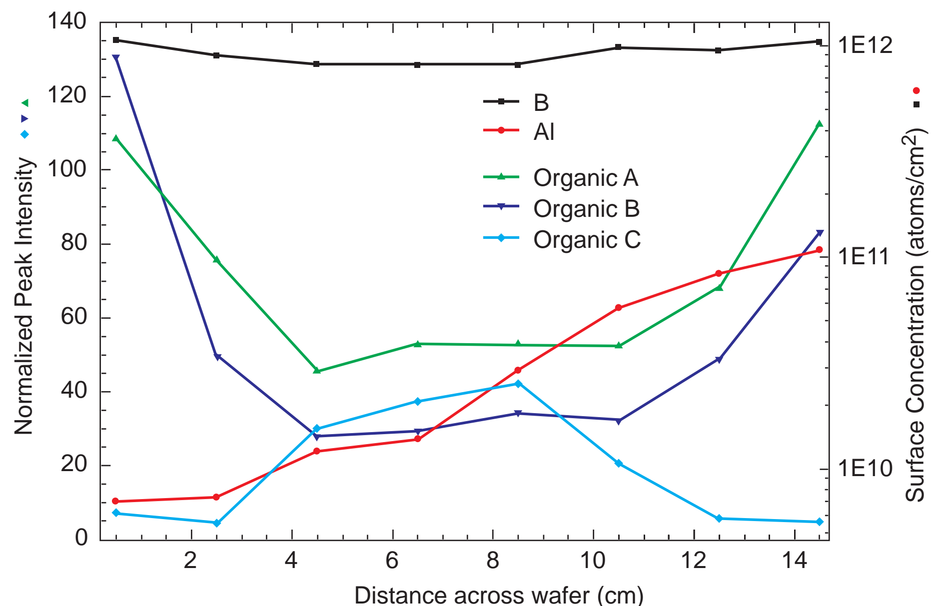
There is a growing interest in the impact of molecular contamination on semiconductor device yields. As line widths shrink, the control of these contaminants becomes more critical. In order to control contaminants, it is important to determine their chemical composition so that they can be traced to a source.

Time-of-flight Secondary Ion Mass Spectrometry (TOF-SIMS) can be used to detect and identify a wide range of organic and inorganic contaminants on wafers and other materials. It can also be used to determine the distribution of contaminants on whole wafers (200 mm diameter or smaller).

The data below show the distribution of several contaminants from the flat to the opposite edge of a six inch wafer. The organic components A and B have higher intensities at the edges of the wafer, while compound C is more abundant near the center (left-hand axis). These contaminants are often plasticizers, anti-oxidants, amines, surfactants and silicones that deposit on wafers.

TOF-SIMS can also provide semi-quantitative data on some inorganic components (right-hand axis). On this wafer, the Al level rises systematically from $7x10^9$ atoms/cm^2 to $1x10^{11}$ atoms/cm^2 moving away from the wafer flat, while the B concentration is uniform across the wafer.

Identifying and mapping contamination is important for determining the source of contaminants and eliminating them. TOF-SIMS is uniquely suited to address these needs.



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