



AN 360 SIMS Analysis of Small Area SiGe Device Samples

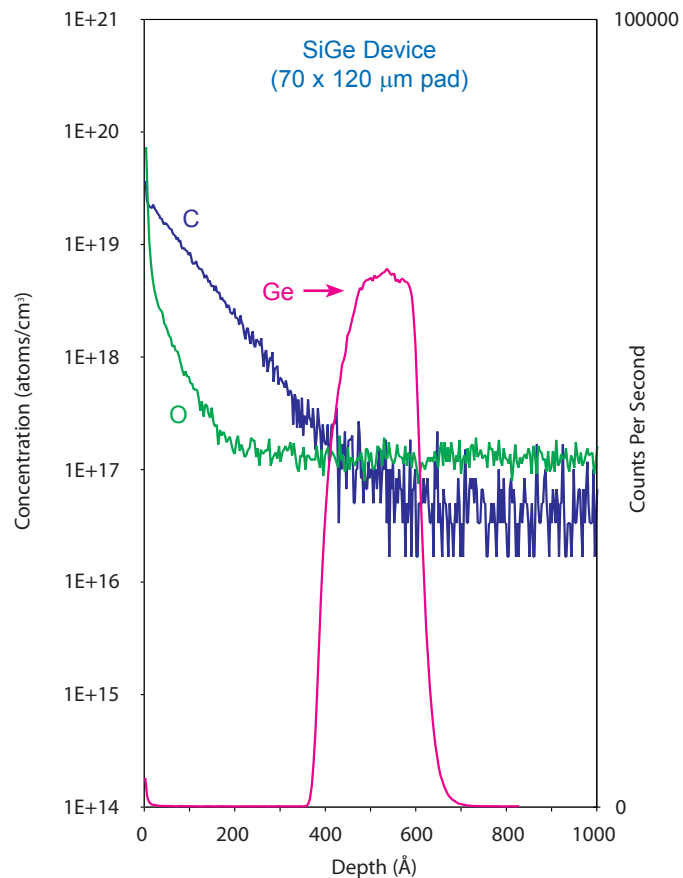
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Discussion

As device dimensions decrease and wafer real estate increases in value, it becomes ever more important to conserve the space dedicated to test structures. Most SIMS test structures have been designed with a minimum size dimension of 100- μm . It has been very difficult to obtain useful data on structures of smaller dimensions. In some cases appropriate test structures do not exist. SiGe material vendors and device manufacturers would benefit from the ability to perform SIMS measurements on devices <100 μm in size.

It has not been previously possible to combine good depth resolution and low detection levels in SiGe, and also do this in a small area device. A low primary beam energy is required for good depth resolution. A well-focused primary beam is required to measure a small device.

SIMS is an extremely valuable tool for determining implant, dopant, and impurity concentration depth distributions. Depth resolution and detection levels are highly dependent on the instrumental setup, as well as the ratio of measured area to device area. We have acquired SIMS results on areas as small as 25- μm on a side. As an example, the figure shows C and O profiles taken from a 70- μm x 120- μm area with a detection area 10 μm in diameter. Excellent detection levels were achieved for these elements. The analysis was performed using low energy Cs (3 keV) to maintain good depth resolution.



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