AN 360
SIMS Analysis of Small Area SiGe Device Samples

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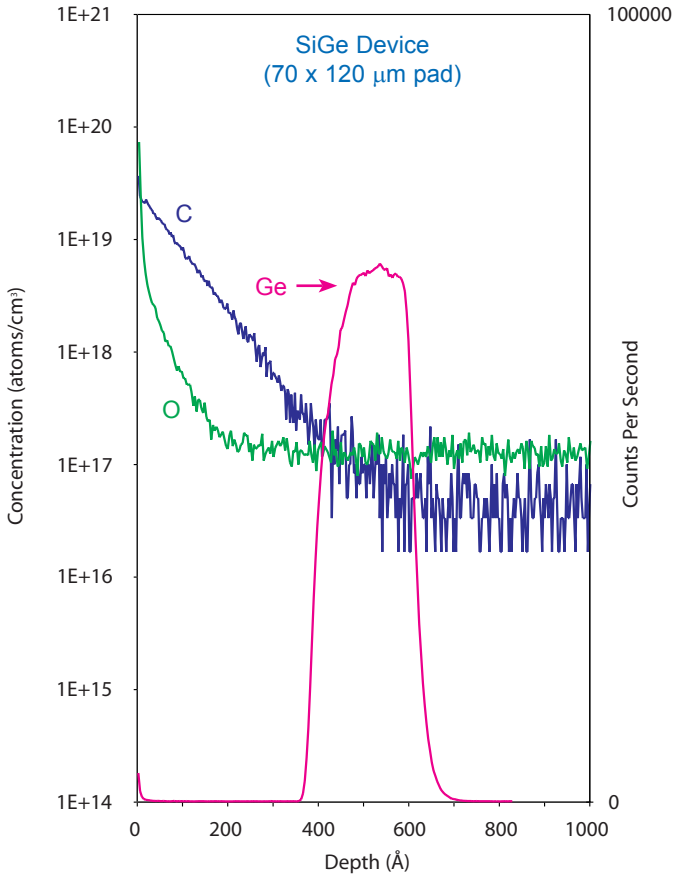
Discussion

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.



United States Locations

Tempe, Arizona
+1 480 239 0602 info.az@eaglabs.com
+1 602 470 2655 fax

Sunnyvale, California
810 Kifer Road
+1 408 530 3500 info.ca@eaglabs.com
+1 408 530 3501 fax

1135 E Arques Avenue
+1 408 738 3033
+1 408 530 3035 fax

785 Lucerne Drive
+1 408 737 3892
+1 408 737 3916 fax

Peabody, Massachusetts
+1 978 278 9500 info.ma@eaglabs.com
+1 978 278 9501 fax

Chanhassen, Minnesota
+1 952 828 6411 info.mn@eaglabs.com
+1 952 828 6449 fax

East Windsor, New Jersey
+1 609 371 4800 info.nj@eaglabs.com
+1 609 371 5666 fax

Syracuse, New York
+1 315 431 9900 info.ny@eaglabs.com
+1 315 431 9800 fax

Raleigh, North Carolina
+1 919 829 7041 info.nc@eaglabs.com
+1 919 829 5518 fax

Round Rock, Texas
+1 512 671 9500 info.tx@eaglabs.com
+1 512 671 9501 fax

International Locations

Shanghai, China
+ 86 21 6879 6088 info.cn@eaglabs.com
+ 86 21 6879 9086 fax

Tournefeuille, France
+ 33 5 61 73 15 29 info.fr@eaglabs.com
+ 33 5 61 73 15 67 fax

Frankfurt, Germany
+ 49 (0) 693053213 info.de@eaglabs.com
+ 49 (0) 69307941 fax

Tokyo, Japan
+ 81 3 5396 0531 info.jp@eaglabs.com
+ 81 3 5396 1930 fax

HsinChu, Taiwan
+ 886 3 5632303 info.tw@eaglabs.com
+ 886 3 5632306 fax

Uxbridge, United Kingdom
+ 44 (0) 1895 811194 info.uk@eaglabs.com
+ 44 (0) 1895 810350 fax