AN 449
Measuring Cluster Ion Implants using EAGLABS℠ PCOR-SIMS℠

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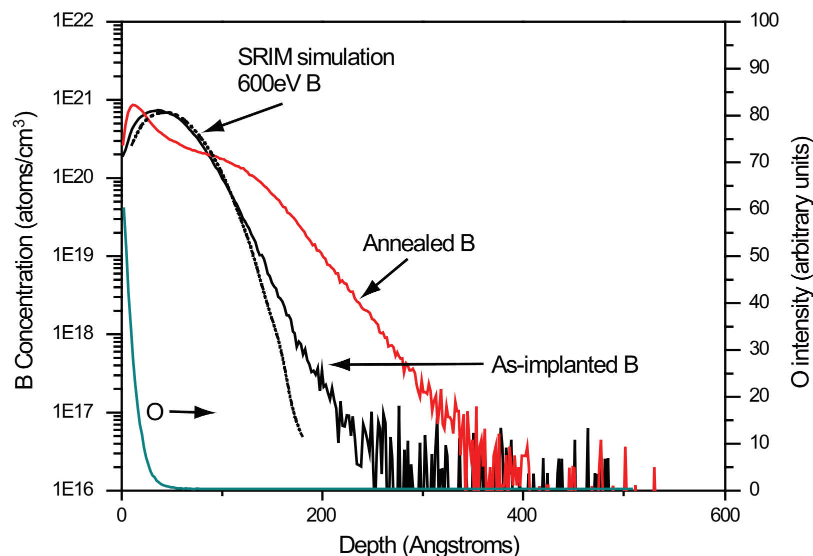
Introduction

The development and improvement of Ultra Low Energy (ULE) boron ion implantation is an area of intense interest as device dimensions continually shrink. Correct characterization of these implants requires accurate profile shape and accurate oxide layer thickness determination within the upper several nanometers of the wafer surface. **EAGLABS℠ PCOR-SIMS℠*** represents the latest improvements in ULE B characterization that incorporates point-by-point data corrections for all regions of the profile. This method avoids near-surface profile distortions introduced by the older oxygen flooding technique and yields the most accurate junction depth measurements due to accurate measurement of surface oxide thickness.

Discussion

The figure below shows SIMS data obtained from a B implant produced by implantation of a $B_{18}H_x$ cluster ion. The excellent Gaussian shape and agreement to SRIM (http://www.srim.org/) simulation show good energy purity for this implant. The profile after annealing shows that some B has segregated to the oxide/ silicon interface and that there has been some diffusion deeper into the sample. The accurate shape of the B profile in the region of 30-80 Angstroms allows accurate calculation of B dose loss after etching, once the surface oxide layer is removed.



Comparison of **EAGLABS℠ PCOR-SIMS℠** profiles of as-implanted and annealed B profiles. The oxygen profile is shown relative to the right side axis to demonstrate the thickness of the surface oxide layer.

* The new PCOR-SIMS℠ for ULE B protocol is the result of extensive development efforts by EAG. The “PCOR-SIMS℠” name describes, in part, EAG’s proprietary methodology that includes point-to-point correction resulting in the most accurate SIMS profiling yet for ultra shallow implants.

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