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MEIS study of As and Sb implantation in Si(001) with excess vacancy concentration and SIMOX. MATEUS DALPONTE, HENRI BOUDINOV, UFRGS, Brazil, LYUDMILA GONCHAROVA, ERIC GARFUNKEL, TORGNY GUSTAFSSON, Rutgers University, USA — We have studied the behavior of dopants (As and Sb) in Separation-by-IMplanted-OXygen (SIMOX) and in vacancy-rich layers in bulk Si(100). The vacancy layers were created by 240 keV O_2^+ or N_2^+ ion implantation at 400 $^\circ$C with a dose of 2.5x10^{16} cm^{-2}. Each of the O or N pre-implanted samples was then implanted at 20 keV at room temperature with only one of the dopants to a dose of 5x$10^{14}$$cm^{-2}$. The samples were then annealed either using Rapid Thermal Annealing (RTA) or Furnace Annealing (FA) and characterized using Medium Energy Ion Scattering (MEIS) in both channeling and random directions. Bulk Si samples without O or N pre-implantation were also prepared for reference. The results showed marked differences in dopant diffusion between all of the samples, for instance, faster diffusion of As in the N pre-implanted compared to the O pre-implanted ones. Also, diffusion is faster for Sb in SIMOX than in Si without N or O pre-implantation. Another observed effect was that both dopants presented stronger Transient Enhanced Diffusion (TED) in the N pre-implanted samples. These differences might be associated with the structure of the vacancies (large clusters in SIMOX and point defects in the O or N pre-implanted samples) as well as with chemical effects of O or N in the pre-implanted samples.

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