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Characteristics of Vacancy Supersaturations from High-Energy Ion Implantation in Silicon

R. Kalyanaraman, T. E. Haynes, M. Yoon, B. C. Larson
Oak Ridge National Laboratory, Solid State Division, Oak Ridge, TN, USA.
V. C. Venezia, L. Pelaz, J. L. Benton, D. C. Jacobson, H.-J. Gossmann, C. S. Rafferty
Lucent Technologies, Bell Laboratories, Murray Hill, NJ, USA.

Vacancy cluster defects from ion implantation in Si have been relatively poorly understood as compared to interstitial-type defects. This has been mainly due to the inadequacy of available techniques to count and profile vacancy defects. Recently, several important advances have been made towards characterizing the vacancy-type defects. The first is the use of high-energy ion implantation to controllably introduce large supersaturations of vacancies in Si that are spatially separated from the corresponding recoil interstitials. Other recent advances include the development of new characterization techniques such as *Au labeling* to quantitatively measure the vacancy concentration and *x-ray microbeam diffuse scattering* in cross-section geometry to obtain the size distribution of the vacancy clusters. In this talk, we will review these recent developments and discuss various characteristics of vacancy-type cluster defects from high-energy implantation, including the dependence of retained vacancy concentration on ion species, dose, annealing temperature, and impurities like C and O, etc.

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