B couples formation and dissolution in ion implanted Si.

EMANUELE RIMINI, LUCIA ROMANO, ALBERTO PIRO, MARIA GRAZIA GRIMALDI, Dipartimento di Fisica, Università di Catania — The off-lattice displacement of electrically active, substitutional B in presence of Si interstitials generated by light ion irradiation has been studied by channeling along the $<100>$ and $<110>$ axes. The channeling yield $\chi$ of B increases with the ion fluence until it saturates at $\chi \approx 0.5$ suggesting a non-random B displacement. At the saturation B is not electrically active and accurate angular scans indicates the formation of B-B couples aligned along the $<100>$ direction in agreement with first principle calculations. The same kind of defect is formed upon B implantation at room temperature as demonstrated also by angular scans with $\chi_B \approx 0.5$. A peculiar behavior is observed upon annealing: at 800 °C a significant increase of randomly located B occurs and $\chi_B \approx 1$, at higher temperatures B recovers progressively into substitional site. The $\chi_B$ reaches 0.1 at 950 °C and the carrier concentration coincides with the amount of substitutional B. The increase of $\chi_B$ at 800 °C can be due to the dissolution of B couples and to an intermediate off lattice location of B before to occupy a substitutional site.