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Dopant effects on dislocation width of dislocations in Si YUTAKA OHNO, Institute for Materials Research, Tohoku University, TOSHINORI TAISHI, Institute for Materials Research, Tohoku Unviersity, YUKI TOKUMOTO, ICHIRO YONENAGA, Institute for Materials Research, Tohoku University — Impurities interact with dislocations in semiconductor crystals, resulting in variations of dynamical activities of dislocations such as mobility and immobilization, and also in leading to inhomogeneity of electrical and optical properties of microelectronic and PV devices. Especially in Si in demanded trend of heavily doping for miniaturized transistors, basic knowledge of dislocation-dopant impurity interaction increases the importance. In CZ-Si doped with n-type impurities of P, As, and Sb, dislocations freshly induced at 1173 K extended their dissociation width with increasing duration of subsequent annealing at the same temperature. The width increased by annealing when the concentration of n-type impurities was high. On the other hand, the dissociation width was unchanged during annealing in Si undoped and doped with p-type impurities of B and Ga. These results suggest that the energy of stacking fault bound to partial dislocations is strongly affected by the number of n-dopant impurities segregated nearby them via their thermal migration, irrespective of atomic size of the dopant impurities; i.e., n-dopant impurities segregate nearby a stacking fault so as to reduce the stacking fault energy.

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