stability of silicon to exterior action. In this connection the investigation of silicon doped REE by samarium and influence on its properties of heat treatments and radiation exposure is important.

In sectional operation the outcomes of investigations of influence of samarium on thermal (600^0C are reduced; 600^0+900^0C; 900^0C+600^0C; 1100^0C; 600^0C+900^0C+1100^0C; 900^0C+ 600^0C+1100^0C) thermal defect formation and radiation defect formation (exposure of γ-quanta ^{60}Co) both in beforehand wrought, and in thermally unfinished samples. After each cycle of heat treatments samples cool fast (throwing off in oil) or slowly (together with the furnace).

Doping n-silicon REE by gadolinium and samarium was carried out during cultivation. The concentration of gadolinium and samarium in silicon, on sectional of a neutron-activation analysis was equaled 10^{14}–$5\cdot10^{18}$ cm^{-3}. As control is model monocrystal silicon such as KEP-15÷50. Para-meters of deep levels originating in control and doped REE samples, both past heat treatment or temperature cycling, and irradiated by the γ-quanta are defined by methods of a capacity spectroscopy: DLTS and IRC.

The obtained outcomes have shown, that in irradiated with the γ-quanta ^{60}Co deep levels samples are formed with energies: E_C-0,17 eV, E_C-0,32 eV, E_C-0,41 eV. Thus the parameters of deep levels vary depending on requirements of prestress heat treatment. For example heat treatment at 600^0C essentially increments a velocity of introduction of and centre (deep level of E_C-0,17 eV), in comparison with a velocity of introduction of this level in samples with prestress heat treatment at 900^0C. In samples n-Si doped by samarium effectiveness of formation of radiation imperfections and the diminution of a lifetime of minority carriers of a charge is much less, in 3-4 μs, than in control (not doped REE) samples.

The influence of heat treatments and effectiveness of introduction of radiation defects (RD) is explained by properties of samarium, as getter, formation of clusters and sinks RD, and modification of states of rigid solutions silicon - oxygen and silicon - carbon.

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INFLUENCE OF THE RADIATION TYPE ON PROPERTIES OF SILICON DOPED BY ERBIUM

Nazyrov D.E.
National University, Tashkent, Uzbekistan

It is known that on effectiveness of formation and kinetics of annealing of radiation damages presence causing, uncontrollable electrical of fissile or inactive impurities, the concentration and position in a lattice of the semiconductor strongly influence. From this point of view, the impurities of group of rare earths elements (REE) represent major interest, since interacting with primary radiation imperfections they create electrical passive complexes such as "impurity+defect", thus raising radiation stability of silicon.

The purpose of sectional operation was the investigations of influence such as radiation exposures: in γ-quanta ^{60}Co and high-velocity electrons with an energy 3,5 MeV on properties of silicon doped REE-erbium. The doping of silicon REE was carried out during cultivation. The concentration REE in silicon, on sectional of a neutron-activation analysis was equaled 10^{14}–10^{18} cм$^{-3}$. As control is model the monocrystalline silicon such as KEP-15–50 was investigation. The experimental outcomes are obtained through methods DLTS, IRC, and also at examination of a Hall effect and conductance is model, measuring of concentration optically active of centers of oxygen and carbon. In samples irradiated in the γ-quanta ^{60}Co in an interval of doses 10^{16}-$5\cdot10^{18}cm^{-2}$ and high-velocity electrons from $5\cdot10^{13}$ up to 10^{18} el.$\cdot sm^{-2}$ the formation various DL in a forbidden region is revealed, which parameters are well-known A- and, E-centres etc. Depending on a radiation dose in an energy distribution of radiation imperfections in Si<Er> of essential concentration modifications is not observed. The comparison doses of associations detected DL in irradiated n-Si<Er> with similar associations in control samples shows, that a velocity of introduction of radiation imperfections (A- and E-centres) and imperfection with a deep level E_C-0,32 eV) in samples containing REE much lower, than in control samples. The lifetime of non-equilibrium charge carriers in crystals Si<Er> changes at an exposure by electrons, considerably, 5-10 times more slowly, than in control samples. Also it is revealed, that at an expo-sure by electrons the velocity of introduction and centers in Si<Er> is less (in 2-3 μs), than in control samples.

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BRAKING OF IONS OF BORON AND NITROGEN IN SILICON AND SILICON CARBIDE

Yarkulov U.Ya., Eshbekov A.A., Ochilov M.J.
State University, Samarkand, Uzbekistan

In this work the elastic and inelastic energy losses of ions are investigated, as well as ranges of boron and nitrogen in samples Si and SiC. It is shown that using the potential of Bohr nuclear stopping power $S_n(E)$ is defined by formula

$$S_n(E) = \frac{2\pi Z_1^2 Z_2^2 e^4}{E} \cdot \frac{M_1}{M_2} \cdot \alpha K_0(\alpha) \cdot K_1(\alpha), \qquad (1)$$

where Z_1, Z_2 - atomic numbers of ion and stopping material, respectively, M_1, M_2 - their masses, E - energy of ion, $K_0(\alpha)$, $K_1(\alpha)$ – function Macdonald. Importance of α is defined from expression

$$\alpha \exp(\alpha) = \frac{Z_1 Z_2 e^2}{E \cdot a_B}, \qquad a_B = \frac{a_0}{(Z_1^{2/3} + Z_2^{2/3})^{1/2}},$$

$a = 0{,}53\cdot10^{-8}\,cm$ is the Bohr radius.

It is shown in the work [1] that under $\vartheta \ll \left|\vec{V} - \vec{U}_i\right|$ electronic stopping power $S_e(E)$ is defined by formula

$$S_e(E) = A\cdot\vartheta, \qquad (2)$$

where

$$A = \frac{2\pi Z_1^2 e^4}{m} \cdot \sum_i \frac{n_i \alpha_i K_0(\alpha_i) K_i(\alpha_i)}{U_i^3} \qquad (3)$$