STUDY OF RADIATION DEFECT ANNEALING IN nc-Si/SiO_2 FILM STRUCTURES

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S u m m a r y

The nc-Si/SiO_2 structures irradiated with γ-quanta to a dose of 2×10^7 rad and annealed in the temperature range 50–450 °C have been studied. The process of radiation defect annealing was shown to be characterized by a distribution of activation energy rather than a unique value. By analyzing the isothermal annealing curves, the frequency factor $A = 10^7$ s^{-1} was determined. Using the data on isothermal and isochronal annealing, the distribution function for the activation energy $n(E_a)$ was calculated. This quantity is distributed within the range of 0.85–1.05 eV and has a peak at 0.96 eV. The calculated annealing parameters make it possible to conclude that radiation-induced defects, which lead to a partial quenching of photoluminescence, emerge at the Si nanocrystal–oxide matrix interface. Their nature and the mechanism of their generation are most likely similar to those which are inherent to surface states formed by ionizing irradiation at the Si–SiO_2 interface in planar metal–oxide–semiconductor structures.