INFLUENCE OF γ-IRRADIATION ON OPTICAL PROPERTIES OF NITROGEN-DOPED nc-Si/SiO_2 STRUCTURES

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S u m m a r y

Infra-red (IR) spectroscopy and photoluminescence (PL) methods have been used to study the radiation properties of nc-Si/SiO_2 and nc-Si/SiO_2:N (nitrogen-doped) structures subjected to γ-irradiation (^{60}Co) to expose doses ranging in the interval $10^3 - 10^7$ rad. In contrast to standard nc-Si/SiO_2 structures, where low doses ($5 \times 10^3 - 1.6 \times 10^4$ rad) of radiation give rise to an increase of the PL intensity, the irradiation of nitrogen-doped samples results in a usual monotonous PL decay. The analysis of the shape of IR-spectra shows that the irradiation does not change the content and structure of the oxide phase in the nc-Si/SiO_2 and nc-Si/SiO_2:N systems. At the same time, the doping with nitrogen substantially improves the structural state of the nc-Si–SiO_2 interface, so that the low-dose effect is absent in this case. The number of defects – in particular, dangling bonds – becomes reduced, and γ-quanta create only new defects, which results in a monotonous decay of the PL intensity, when the expose dose grows.