INFLUENCE OF HIGH-FREQUENCY ELECTROMAGNETIC RADIATION ON PHOTOLUMINESCENT AND ELECTRONIC PROPERTIES OF NANOCRISTALLINE SILICON/MONOCRISTALLINE SILICON SYSTEMS

E. B. Kaganovich, S. I. Kirillova, E. G. Manoilov, V. E. Primachenko, S. V. Svechnikov, R. V. Konakova, E. F. Venger, I. R. Basylyuk, I. M. Kizyak

Institute of Semiconductor Physics,
Nat. Acad. Sci. of Ukraine
(45, Nauky Prosp., Kyiv 03028, Ukraine)

S u m m a r y

Time-resolved photoluminescence (PL) spectra and photovoltage tem-perature dependences on the nc-Si/*p*-Si, nc-Si⟨Ag⟩/*p*-Si, and nc-Si⟨Au⟩/*p*-Si structures obtained by pulse laser ablation prior to and after the moderate (1.5 W/cm^2) high-frequency (HF) magnetron field irradiation have been investigated. It was discovered that the photovoltage in nc-Si films and the concentration of electron traps in nc-Si films and *p*-Si substrates were decreased after HF exposure in all structures. In the nc-Si/ *p*-Si and nc-Si⟨Ag⟩/*p*-Si structures, the interface electron states (IES) densities on *p*-Si substrates are also decreased; the PL intensity and the PL decay time are increased. At the same time, the exposure of the nc-Si⟨Au⟩/*p*-Si structures which had higher PL intensity and PL decay time prior to irradiation decreases these values and results also in some increase of the IES density. The great intensity (7.5 W/cm^2) of HF field worsens photoluminescent properties up to the total vanishing of PL. The mechanism of the influence of HF field on the properties of the structures investigated is discussed.