Nanostructural surfaces

Application of nanofilled polymer coatings for increasing the radiation resistance of solar cells

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Nowadays the solar-Si (s-Si) crystals dominate in solar power engineering since the efficient techniques of manufacturing solar cells (SC) of them are well-known. In external aggressive environment, e. g., under action of ionizing radiation, the s-Si crystals undergo phenomena and processes inducing the degradation of their functional parameters.

In this connection, the necessity arises of accumulating experimental data on the ways of preventing the degradation of different, first of all, electrophysical parameters of SC. The urgency of the problems outlined determined the aim of our study. It consisted in developing the methods of improving the stability of the s-Si crystal electrophysical parameters under action of ionizing radiation. This technique was based on the search of the optimal combination of nanofilled epoxy-urethane coatings applied on the s-Si surface with the action of low-energy X-rays under which the degradation of electrophysical parameters determining the s-Si photovoltage is reduced. It is shown that X-ray irradiation of the s-Si in the presence of a filler (polysiloxane particles (PSP)) in the epoxy-urethane matrix in mass concentrations of 0.001 and 1.0 % m/m leads to quite big recombination losses. At the same time, at PSP filler content of 0.5 % m/m the passivation epoxy-urethane coatings exhibit increased radiation resistance providing a minimal degradation of functional (electrophysical) characteristics.