

*Title:* Optical properties of silicon nanostructures for photovoltaics

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*Abstract:* In the presented work silicon nanocrystals located in the SiC matrix are studied - samples differ in adding a dopant (boron) into the particular layer of structure during deposition by PECVD and in hydrogen passivation.

Silicon nanocrystals are very important because of their effective photoluminescence and absorption in visible part of the spectrum, which is not observed in bulk silicon. Properties of such structures are tunable by changing parameters during preparation with respect to the final application. The basic idea of nanostructures integration in silicon solar cells is to increase the conversion efficiency of the solar spectrum combining several thin layers of nanocrystals and bulk Si cell so that each layer of solar cell absorbs a certain part of the spectrum.

The processes that take place in these structures immediately after excitation of carriers, however, are still not fully described. The goal of this work is to characterize these phenomena using methods of time-resolved spectroscopy. Another object is to describe the influence of doping of the individual parts of the material and the effect of the remote plasma hydrogen passivation on the behavior of photoexcited carriers and intensity of photoluminescence.

*Keywords:* silicon, nanocrystals, ultrafast spectroscopy