This diploma thesis deals with optical properties of silicon nanocrystals implanted in silicon oxide substrate. We examined samples with various concentrations of nanocrystals. We measured Raman spectra of our samples and identified size of nanocrystals and distance between them as function of depth. We measured absorption and reflection of samples and calculated the energy of band gap. For various implantation doses we examined temperature dependence of luminescence spectra. Two peaks were observed for excitation wavelength of 408 nm, the first shifts towards longer wavelength with increasing temperature, the second one stays unchanging. We observed low-temperature resonant luminescence in order to identify fonon structure. During observation of time-resolved luminescence two components of fast luminescence appeared – the slower in scale of nanoseconds, the faster in scale of picoseconds. We devoted to study of the faster component. For the faster component we observed up-converted luminescence. Intensity dependence of this component is quadratic. We also observe degradation of luminescence owing to strong laser beam. In conclusion we discussed origin of each component of luminescence spectra.