**Nanooptics and nanophotonics**

**Third order optical susceptibilities of the cooper oxide thin films**

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 The study of the nonlinear optical susceptibility of thin films of metal oxides remains an important area of research due to the possibility of their use for optical communications and optical limiting devices. Previously, we have shown the presence of a large nonlinear susceptibility of third order χ(3) in thin films of iron oxide [1], chromium oxide [2] and oxide of palladium [3]. thin films of copper oxide also attract interest of researchers as a medium with high optical nonlinearity [4].

 Fig.1. Linear optical absorption properties of cooper oxide thin films.

Using the technique of reactive pulsed laser deposition in a vacuum reactor made of stainless steel, we obtained samples of thin films of copper oxide on glass substrates at various substrate temperatures Ts and the various pressures of oxygen PO2 in the chamber. Fig.1 shows the absorption spectra of these samples. The band gap of the films, depending on deposition conditions were determined in the range of 2.58 – 2.87 eV.

The study of the cubic nonlinear susceptibility using the techniques of Z-scan at 532 nm when exposed to nanosecond laser pulses revealed the presence of negative refractive nonlinearity. The greatest value of the real part of the cubic nonlinear susceptibility is equal to Reχ(3) =-5.3×10-5 esu. Also, in the samples exhibit nonlinear absorption, which changes the sign depending on the conditions of synthesizing the sample.

The large optical nonlinearity of the cooper oxide thin films indicated their potential application for future nonlinear optical devices.

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