Chromium doped zinc oxide thin solid films were deposited on sodocalcic glass substrates. The photoconductivity of the material and its influence on the optical behavior was evaluated. A non-alkoxide sol-gel synthesis approach was used for the preparation of the samples. An enhancement of the photoluminescence response exhibited by the resulting photoconductive films with embedded chromium nanoclusters is presented. The modification in the photoconduction induced by a 445 nm wavelength was measured and then associated with the participation of the optical absorptive response. In order to investigate the third order optical nonlinearities of the samples, a standard time-resolved Optical Kerr Gate configuration with 80 fs pulses at 830 nm was used and a quasi-instantaneous pure electronic nonlinearity without the contribution of nonlinear optical absorption was observed. We estimate that from the inclusion of Cr nanoclusters into the sample results a strong optical Kerr effect originated by quantum confinement. The large photoluminescence response and the important refractive nonlinearity of the photoconductive samples seem to promise potential applications for the development of multifunctional all-optical nanodevices.

Keywords: Photoluminescence, Thin Solid Films, Ultrafast Nonlinear Optics

References:


Presenting author's email: gcamachogonzalez@gmail.com