

NON-LINEAR OPTICAL RESPONSE OF METAL NANOCOMPOSITE FILMS

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Nanocomposite thin films formed by metal or semiconductor nanoparticles embedded in an insulating/transparent host are known to exhibit an intense third order non-linear response with build-up times of the nonlinearities of a few picoseconds. The non-linear response is caused by dielectric and quantum confinements, which are a result of the small dimensions of the nanoparticles compared to both the wavelength of light and the mean free-path of the electrons. This talk will focus on nanocomposites formed by metal nanoparticles embedded in an oxide host and will describe the synthesis procedure and the key parameters that should be controlled in order to produce a tailored nanostructure. The linear optical properties will be illustrated for the case of Cu and/or Ag nanoparticles and the non-linear response, both in thin film and waveguide configuration, will be shown for the case of Cu. The relevance of these composite materials for the development of all-optical switches will be finally discussed.