Laser operated borate polymer nanocomposites

Abstract

We have found that UV polarized treatment of the nanocrystals (non-centrosymmetric $Li_2B_4O_7$ and centrosymmetric α-BaB_2O_4) embedded into the olygoether acrylate photopolymer samples cause substantially different response depending on the laser features. For the $Li_2B_4O_7$ NC, during treatment by pulsed 7 ns laser polarized nitrogen laser pulses at 337 nm we observed substantial red spectral shift of the energy gap from 7.3 eV up to 6.3 eV. The spectral shift is disappeared during the 15 min after the interruption of optical treatment. The effect exists only in the nanocrystallites with sizes below 200 nm. At the same time for the centrosymmetrical α-BaB_2O_4 nanocrystallites this effect was absent. However the photoinduced second order optical effects induced by coherent bicolor treatment by wavelengths 532 nm and 266 nm are enhanced for the α-BaB_2O_4 NC and are absent for the $Li_2B_4O_7$ on.