Photofluorescent recording media for 3D optical memory devices

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Now it is important to develop a new generation of optical recording media with super high information capacity and fast processing. The process of recording information in such carriers is based on a two-photon photochemical transformation of photosensitive systems in a multilayer recording medium. This paper discusses own results on the development of photochromic and photochromogenic polymer materials for two-photon three-dimensional (3D) bitwise working and archival optical memory with fluorescent readout.

In the course of the research, multilayered polymeric recording media with alternating transparent waveguide, information and locking layers have been developed. These media provide layer-by-layer two-photon photoconversion of photochromic and photochromogenic organic substances and layered fluorescence readout of optical information due to the choice of refractive indices for each layer.

The possibility of creating 3D multilayered bitwise working optical disks using the phenomenon of Forster resonance energy transfer (FRET) from the organic fluorophore (phenalenone) to the cyclic form of photochromic diarylethene is shown. Samples of 3D multilayer optical disks of archival type based on the irreversible photochemical transformation of non-fluorescing chromon into a fluorescent photoproduct are created. The main characteristics of recording by laser radiation and fluorescence readout of optical information are determined.

The results of studding the functional properties of a sample of a three-layer optical disk with the use of the home-made optical device for recording and readout optical information indicate the possibility of creating multilayer optical disks of standard size with an information capacity of up to 2.6 TB and fluorescent readout.

Bibliography

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