Advances in Design of Light – Sensitive Organic Compounds for Optical Memory Devices

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Progress of information technique has motivated the development of new light-sensitive organic recording media of high resolution and optical functional devices based on them for writing, storage, processing and display of optical information in the real time. One of the main tasks is the change DVD optical disks (ODs) possessing information capacity of 50 GBytes by multilayer ODs of more 1 TBytes. Decision of this task is possible using high resolution light – sensitive recording media based on reversible and irreversible photochemical reactions of organic compounds. This paper presents an analysis of own results in the field of the study of properties and application of certain light-sensitive heterocyclic compounds for the development of optical memory devices.

As a result of the study properties of more 300 new thermally irreversible photochromic dihydroxybenzene (I) and fulgimides (II) as a function of their structure, a lot of compounds with acceptable characteristics has been established. Among these compounds cyclopentene and maleimide derivatives of dihydroxybenzenes manifest the best characteristics. Besides, photochromic polymers containing dihydroxybenzene fragments into main or side chains have been synthesized.

\begin{figure}[h]
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\includegraphics[width=\textwidth]{figure1.png}
\caption{(I) and (II) show the structures of thermally irreversible photochromic compounds. (I) is a typical example of a dihydroxybenzene compound, while (II) shows a fulgimide derivative.}
\end{figure}

Methods for nondestructive refractive and fluorescent readout of optical information have been developed. Received results allow to start the development of photochromic recording media multilayer ODs for bitwise working 3D optical memory.

Aiming the development of multilayer ODs for bitwise archives optical memory, about 20 chromone derivatives (III) manifesting irreversible photochemical transformations forming fluorescent products have been synthesized. Besides chromones, a number of luesodyes forming

\begin{figure}[h]
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\includegraphics[width=\textwidth]{figure2.png}
\caption{(III) shows the synthesis of a typical chromone derivative. This compound undergoes photochemical transformations forming fluorescent products.}
\end{figure}

fluorescent dyes under UV irradiation have been revealed too. The study of a dependency between functional characteristics and the structure allowed to choose a number of compounds meeting to requirements of their target application.

In conclusion, the results of the search of thermally irreversible photochromic compounds for application as photosensitizers into photopolymerizable recording media for holographic archives 3D optical memory with super high information capacity are reported. It was shown that a number of thermally irreversible dihydroxybenzenes, spirooxanes and phenoxy derivatives of quinones meets to requirements for application and may simplify processing of holograms after their writing.

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