

The technology of manufacturing carriers for long-term storage of the information in a digital form

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The problem of long-term storage of the digital information is one of the most important for maintaining the functioning of digital archives and libraries. Transition to a digital form of data presentation has allowed to solve problems of operative search and the organization of the removed access to the information. Creation of huge archives of information materials in the digital form has led to appearance of some problems which demand a solution in the near future: creation of reliable carriers for long-term storage of the digital information, development and introduction of special formats for recording the information subject to long-term storage, development of special information reading devices. Besides at organizing the storage of electronic documents it is necessary to provide integrity and authenticity of documents, a code designation of a place of their storage, software and hardware for accessing the documents. Now intensive attempts to bypass a problem of fast obsolescence of software and hardware for reading electronic documents are undertaken by data representation and storage in an analog form on highly stable carriers (metal disks, silver halogenide microfilms). If necessary their transfer in a digital form can be carried out. Such approach is possible for storage of text documents, graphic materials, but cannot be recommended for storage of the multimedia data.

Despite of importance and complexity of tasks on solving a problem of fast obsolescence of software and hardware and obsolescence of information reading systems, the major problem is creation of carriers for long-term storage of the digital information.

Necessary terms of storage of many documents exceed technical opportunities of modern carriers for digital recording. For manufacturing digital archives and libraries several types of carriers having both different capacities and terms of data storage are used. The guaranteed term of storing data on magnetic tapes which are most frequently used in archives does not exceed 40 years, and the term of storage on the other type of magnetic carriers - hard disks in view of their fast perfection does not exceed 3-5 years. Because of insufficient terms for storing many types of text and graphic documents on magnetic carriers it is proposed to use widely microfilms, the guaranteed term of storing of which can make 100 years. The great hopes on maintenance of a long data storage one connects with the use of optical carriers. It is determined by the fact that at reproduction of the information from them the non-contact method of reading is realized, effective protection of the information against distortions is provided, relief representation of the information is widely used. The comparative high densities of information recording on optical carriers and speeds of reproducing information from them allow to use such carriers for storing different types of information (audio data, video information, multimedia information). The optical carriers CD-R, DVD-R are used widely for recording digital copies in the process of digitizing archival documents, audio records, films. Unfortunately, modern compact

discs (especially CD (DVD)-R, CD (DVD)-RW) do not justify hopes for a long and reliable data storage. It is connected first of all not to aging the software and hardware used for reading of the information, but with time instability of characteristics of the compact discs which are recommended to copy not rarely that once in 5 years (and in some cases once in 2-3 years).

Operation experience of optical disks such as WORM with glass substrates shows an opportunity of essential increase in service life by using of more stable materials of substrates and information layers. The combination of highly stable substrates of WORM disks and the relief data presentation used on stamped compact discs, will allow to make carriers which have really a long term of reliable data storage (tens of years). For obtaining relief microimages on the surface of monocrystal or quartz substrates can be used methods of ion or plasmachemical etching which are investigated well and are used widely in microelectronics. The conducted experiments show that the ion etching permits to obtain on quartz substrates the relief structures, which correspond to the used ones for presenting information on the standard CDs. The information carrier, in which such a quartz substrate is used, by main characteristics corresponds exactly to indicators of standard CDs. The difference consists in the fact that such an optical carrier has a mass twice as much. Great longevity of such carriers is ensured by high temporal stability of substrate properties and high adhesion of a reflective layer to the quartz substrate. Existing methods of vacuum metallization of glass (quartz) substrates can provide creation of highly stable reflective layers on an information surface of data carriers. In carriers of new formats like HD DVD, BD as substrates of carriers the opaque ceramic materials having high mechanical strength and long-term stability can be used. The use of optical disks with high-stability substrates does not exclude the application of standard CDs in the process of documents digitization. In the first stage on a small-size, available equipment the digital copies are recorded on the standard compact disks CD-R, DVD-R.

Certainly, even the most reliable carriers do not exclude realization of the necessary process of migration, but allow to make it much less often.