Devices

Central Research Laboratory
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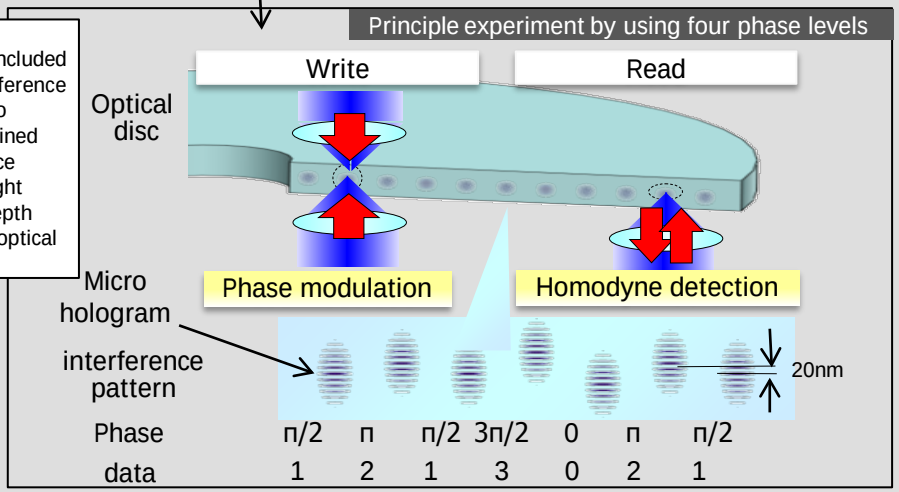
Hitachi, Ltd., web site【20th July 2011 News Release】http://www.hitachi.com/New/cnews/110720.html

Successful verification of the principle of a ‘‘phase multi-level read/write method’’ for doubling data capacity of optical discs

■Comparison of the amount of information per recording mark

	2 levels	4 levels	8 levels	16 levels	32 levels
Current optical disc	2^1 (0,1)				
Phase multi-level method	2^1 (0,1)	2x (2^2)	3x(2^3)	4x(2^4)	5x(2^5)

Principle：Phase information is included in a micro-interference pattern (a micro hologram) obtained from interference between two light waves in the depth direction of an optical disc.



A phase multi-level read/write method is a technology that significantly increases the data capacity of optical discs for archiving video and music. Recording multi-bit (4, 8, 16 or 32 phase levels) information in a single recording mark makes it possible to increase data capacity of optical discs two, three, four, or five times. Data read/write by using four phase levels was experimentally demonstrated.

■Features of developed technology

Recording marks recorded in the depth direction of an optical disc were reproduced by using a homodyne detection technology, which amplifies detection signals by using the coherency of light. In particular, four marks were recorded at an interval of 20 nanometers in the depth direction of the recording layer. Detection of the formed recording marks confirmed that the four-level signals corresponding to the formed recording marks can be reproduced.

■Future directions

Aiming to practically apply the phase multi-level read/write method, we will further develop the method through demonstration experiments using a recording and reproducing apparatus mounted in a compact phase multi-level reproducing module.

■A word from the development team

Fields such as wireless communication, optical communication, and semiconductor memory are already employing a multi-level technology, which does not deal with information as binary data (0 and 1) but records and transmits as multi-level data (00, 01, 10 and 11) at a time. We aim to achieve multi-level read/write in optical discs by using the developed method.