

## OPTICAL INFORMATION STORAGE MEDIUM AND METHOD OF RECORDING INFORMATION THEREON

### 5    Technical Field

The present invention relates to an optical information storage medium and a method of recording information thereon, and more particularly, to an optical information storage medium on which write protection information and defect management information is recorded, and a method of recording such information thereon.

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### Background Art

Optical discs are generally used as information storage media of optical pickup devices which record information on and/or reproduce information from the optical discs without contacting the optical discs.

15    Optical discs are classified as either compact discs (CDs) or digital versatile discs (DVDs) according to their information recording capacity. CDs and DVDs further include CD-Rs, CD-RWs, DVD+RWs, DVD-random access memories (DVD-RAMs), DVD-R/rewritables (DVD-RWs), and so forth. Furthermore, high-density digital versatile discs (HD-DVD) having a recording capacity of 20GB or more have been developed.

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When a user uses such an optical disc, the user may desire not to record supplemental information on the optical disc any more, depending on the intended use of the optical disc. For example, when the user desires to only reproduce data recorded as archived files, additional data must be prevented from being recorded on the optical disc. For this, the need for recording write protection information has been raised and write protection information has been already recorded on DVD-RAM/R/RWs. However, even when the optical disc is

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write-protected, a portion of the optical disc should be recordable, if necessary. For example, even if the optical disc is write-protected, data should be able to be recorded in an area such as a spare area so that a defect area can be replaced with the spare area in order to manage defects, and as such, the write protection information and the defect management information should be able to be recorded on the optical disc, too.

#### Disclosure of the Invention

10           The present invention provides an optical information storage medium on which defect management information necessary for indicating whether defect management is permitted is recorded when write protection information is recorded, and a method of recording information thereon.

15           According to an aspect of the present invention, there is provided an optical information storage medium including a lead-in area, a user data zone in which user data is recorded, and a lead-out area. Here, write protection information is recorded along with defect management information.

20           The user data zone includes an inner spare area and an outer spare area, which are to replace a defect area, and a user data area in which the user data is recorded, and if the defect area can be managed, the user data area is write-protected. A drive test zone and a disc identification zone included in at least one of the lead-in area and the lead-out area, and the inner spare area and/or the outer spare area are recordable.

25           If the defect area cannot be managed, the user data area and a defect management zone included in at least one of the lead-in area and the lead-out area are write-protected. A drive test zone included in at least one of the lead-in area and the lead-out area and a disc identification zone which is included in at least one of the lead-in area

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and the lead-out area and in which the write protection information is recorded are recordable.

According to another aspect of the present invention, there is provided a method of recording information on an optical information storage medium including a lead-in area, a user data zone in which user data is recorded, and a lead-out area. Write protection information is recorded. Defect management information necessary for indicating whether a defect area occurring when reproducing data can be managed is recorded.

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#### Brief Description of the Drawings

FIG. 1 illustrates the structure of an optical information storage medium according to the present invention; and

FIG. 2 is a view for explaining a method of recording write protection information on an optical information storage medium according to the present invention.

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#### Best mode for carrying out the Invention

FIG. 1 illustrates the schematic structure of an optical information storage medium (a disc) including a lead-in area 10, a user data zone 20 in which user data is recorded, and a lead-out area 30. The lead-in area 10 may include a disc test zone 10a, a drive test zone 10b, a defect management zone 10c, a disc identification zone 10e, and a buffer zone 10f. The lead-in area 10 may further include at least one reserved zone 10d in which other pieces of information can be recorded.

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Disc control information or information on the state of the disc can be generally recorded in the disc identification zone 10e. In the present invention, write protection information and defect management information can be recorded in the disc identification zone 10e. The disc identification zone 10e can also be called a "disc-related information zone" or a "disc control zone" according to various formats. The

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lead-out area 30 has a similar structure to the lead-in area 10, and thus will not be described herein.

The user data zone 20 includes an inner spare area 20a and an outer spare area 20c, which are to be replaced with a defect area, and a user data area 20b in which user data is recorded. If the user data area 20b has a defect area, data recorded in the defect area is copied into the inner spare area 20a or the outer spare area 20c. Information on the defect area and information on the inner spare area 20a or the outer spare area 20c with which the defect area has been replaced can be recorded in the defect management zone 10c. Further, data can be reliably recorded and/or reproduced by managing the defect area.

FIG. 2 illustrates write protection information recorded in a byte in a predetermined error correcting code (ECC) block of the disc identification zone 10e. Here, the following information can be recorded according to bit values.

[Table 1]

| Byte      | Contents                                                                  |
|-----------|---------------------------------------------------------------------------|
| 00000000b | Normal recording                                                          |
| 00000001b | Write protection information for (permanently) write-protecting all areas |
| 00000010b | Write protection information permitting defect management                 |
| 00000011b | Write protection information not permitting defect management             |

In Table 1, "normal recording" indicates that data can be recorded, erased, and reproduced. "Write protection information for write-protecting all areas" indicates that data must not be recorded in all areas any more, i.e., all areas are permanently write-protected. In this

case, additional defect management is not necessary and the write protection information cannot be amended.

“Write protection information permitting defect management” indicates that defects occurring when recording or reproducing data can be managed. Here, since information about the defect area has to be recorded to manage the defects, the defect management zone 10c of the lead-in area 10 should be recordable. Also, since data recorded in the defect area has to be copied into a spare area so that the spare area replaces the defect area, the inner spare area 20a and the outer spare area 20c have to be recordable. The drive test zone 10b and the disc identification zone 10e also have to be recordable. Write protection information and defect management information is recorded in the disc identification zone 10e. Here, the write protection information may be selectively recorded by a user. In other words, the user can first record write protection information indicating that the disc is write protected in the disc identification zone 10e, and later, the user can record information indicating that the disc is recordable in the disc identification zone 10e. Thus, it is preferable that the disc identification zone 10e is recordable so that the write protection information can be updated. As described above, in an event that the write protection information permitting defect management is recorded, only the user data area 20b is write-protected.

“Write protection information not permitting defect management” indicates that defects occurring when recording or reproducing data cannot be managed. In this case, all areas are write-protected except the drive test zone 10b and the disc identification zone 10e. In other words, since the defects cannot be managed, the defect management zone 10c, the inner spare area 20a, the outer spare zone 20c, and the user data area 20b are write-protected. Here, even if the defects cannot be managed, it is preferable that the drive test zone 10b is basically recordable to reproduce data and the disc identification zone

10e is recordable to update the write protection information and the defect management information.

As shown in FIG. 2, in the present invention, the write protection information is recorded in a byte in the disc identification zone 10e, i.e., in an N byte. However, the write protection information may be recorded in a plurality of bytes. Here, the write protection information and the defect management information can be recorded by a combination of bits in a predetermined byte. Alternatively, the write protection information and the defect management information may be recorded in separate bytes. In other words, the write protection information may be recorded in the N byte and the defect management information may be recorded in an (N+1) byte.

In the present invention, the write protection information and the defect management information can be recorded in at least one of the lead-in area 10 and the lead-out area 30. However, since the write protection information and the defect management information recorded in the lead-in area 10 or the lead-out area 30 may be damaged, the write protection information and the defect management information may be recorded in both the lead-in area 10 and the lead-out area 30.

In a method of recording information on an optical information storage medium according to the present invention, write protection information can be recorded in at least one of the lead-in area 10 and the lead-out area 30, along with defect management information necessary for indicating whether a defect area occurring when recording or reproducing data can be managed. The write protection information and the defect management information can be, for example, recorded in the disc identification zone 10e.

If the defect management information indicates that the defect area can be managed, the drive test zone 10b, the defect management zone 10c, the inner spare area 20a, and the outer spare area 20c are recordable, and only the user data area 20b is write-protected. If the

defect management information indicates that the defect area cannot be managed, the defect management zone 10c, the inner spare area 20a, the outer spare area 20c, and the user data area 20b are write-protected.

5           While the present invention has been particularly shown and described with reference to an exemplary embodiment thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.

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#### Industrial Applicability

As described above, in an optical information storage medium and a method of recording information thereon according to the present invention, write protection information can be recorded together with defect management information necessary for indicating whether defects occurring when reproducing data can be managed. Even if the information storage medium is write-protected, the defects can be selectively managed using the defect management information.

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What is claimed is:

1. An optical information storage medium comprising a lead-in area, a user data zone in which user data is recorded, and a lead-out area, wherein write protection information is recorded along with defect management information.  
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2. The optical information storage medium of claim 1, wherein the user data zone comprises an inner spare area and an outer spare area, which are to replace a defect area, and a user data area in which  
10 the user data is recorded, and if the defect area can be managed, the user data area is write-protected.
3. The optical information storage medium of claim 2, wherein a drive test zone and a disc identification zone included in at least one of  
15 the lead-in area and the lead-out area, and the inner spare area and/or the outer spare area are recordable.
4. The optical information storage medium of claim 1, wherein if the defect area cannot be managed, the user data area and a defect  
20 management zone included in at least one of the lead-in area and the lead-out area are write-protected.
5. The optical information storage medium of claim 4, wherein a drive test zone included in at least one of the lead-in area and the  
25 lead-out area and a disc identification zone which is included in at least one of the lead-in area and the lead-out area and in which the write protection information is recorded are recordable.
6. The optical information storage medium of claim 1, wherein  
30 the write protection information and the defect management information is recorded in at least one of the lead-in area and the lead-out area.

7. The optical information storage medium of claim 6, wherein the write protection information and the defect management information is recorded in a predetermined error correcting code block in a disc  
5 identification zone in at least one of the lead-in area and the lead-out area.

8. The optical information storage medium of claim 7, wherein the write protection information and the defect management information  
10 is recorded by combining bits contained in one or more bytes in the predetermined error correcting code block.

9. The optical information storage medium of claim 7, wherein the write protection information and the defect management information  
15 is recorded in separate bytes in the predetermined error correcting code block.

10. A method of recording information on an optical information storage medium including a lead-in area, a user data zone in which user  
20 data is recorded, and a lead-out area, the method comprising:  
recording write protection information; and  
recording defect management information necessary for indicating whether a defect area occurring when reproducing data can be managed.

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11. The method of claim 10, wherein the user data zone comprises an inner spare area and an outer spare area, which are to replace a defect area, and a user data area in which the user data is recorded, and if the defect area can be managed, the user data area is  
30 write-protected.

12. The method of claim 11, wherein a drive test zone and a disc identification zone included in at least one of the lead-in area and the lead-out area, and the inner spare area and/or the outer spare area are recordable.

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13. The method of claim 10, wherein if the detect area cannot be managed, the user data area and a defect management zone included in at least one of the lead-in area and the lead-out area are write-protected.

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14. The method of claim 13, wherein a drive test zone included in at least one of the lead-in area and the lead-out area and a disc identification zone which is included in at least one of the lead-in area and the lead-out area and in which the write protection information is recorded are recordable.

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15. The method of any one of claims 10 through 14, wherein the write protection information and the defect management information is recorded in a predetermined error correcting code block in a disc identification zone in at least one of the lead-in area and the lead-out area.

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16. The method of claim 15, wherein the write protection information and the defect management information is recorded by combining bits contained in one or more bytes in the predetermined error correcting code block.

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17. The method of claim 15, wherein the write protection information and the defect management information is recorded in separate bytes in the predetermined error correcting code block.

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