Slide 1
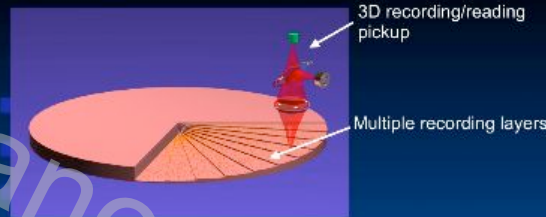
Three-dimensional multi-layered memory and its prospect

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Slide 2

Three-dimensional multi-layered memory

- 3D recording/reading pickup
- Multiple recording layers

- Extending the recording space from 2D to 3D.
- Highly compatibility to current optical disks (CD or DVD).
- Removability same as current optical disks.
- Feasibility was checked for multi-layered ROM disk.
  (Ichimura SONY, ISOM04, We-E-02)
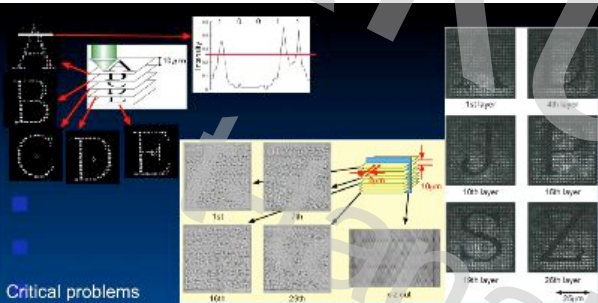- Recordable or Re-writable disks move to dynamic testing.

Slide 3

Key technology

3D recording and reading technique

Two-photon absorption
Confocal microscopy

Keyword is "nonlinearity"

Photo detector
Pin-hole
Dichroic Mirror
Laser

Confocal microscopy
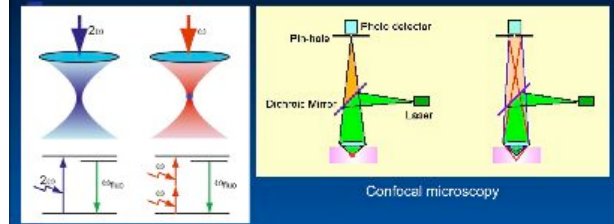
Two-photon absorption
using f-sec laser (100x10^{-15} sec) Light can travel only 30microns!!!

Slide 4

Critical problems
- Light source
  - Small, high-repetition rate, short wavelength f-sec pulse laser
- Recording Material (Disk)
  - Non-linearity, high sensitivity, mass producability
- New optics design
  - 3D focusing/tracking servo, active aberration correction

Slide 5

Appropriate application
Archive media not only for public data but also private data.

Why I chose 3D multilayered recording ?

VHS ⟷ DVD

analogue vs digital ?
magnetic vs optical ?

Most important point is the difference of dimensions.

1D recording: Tape wound on the reel. Sequential access
2D recording: Data is on the disk. Random access.

Slide 6

Next generation optical storage should have high speed random accessibility as well as large recording capacity.

This can be done by extending the dimension from 2D to 3D.

"Indexing" and "Paging" is fundamental key techniques for enhancing the access speed.
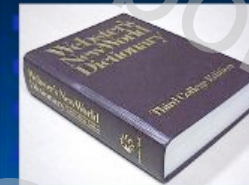
We are already using the 3D recording as well as indexing and paging !!

12 thousands characters/page
1600 page/volume
19million characters

22.4km in 1D
71 m^2 in 2D

papers easy to handling is bound in 3D