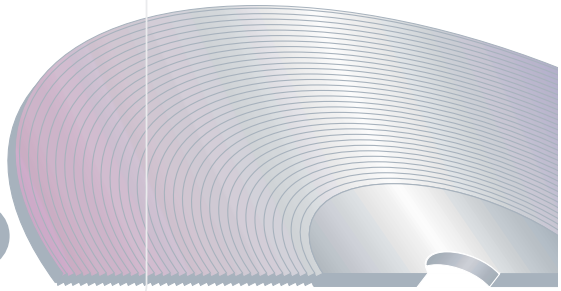
C3D's data storage technology

light years ahead

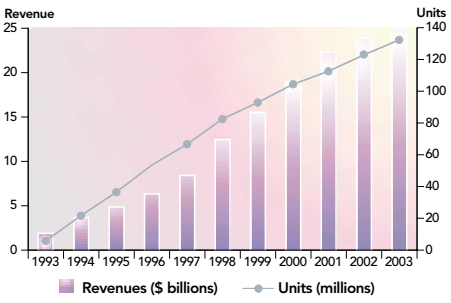
Picture yourself walking into an interactive kiosk, putting in a credit card sized storage device (actual size shown here), downloading a book of your choice, plugging the card into an electronic reading device, and than being on your merry way with all that data? What if people could store up to 150 gigabytes of data on one disk that worked in their home HDTV systems? Imagine if institutions could store terabytes of information on storage devices that are half the cost, twice the speed, and one-tenth the size of the best currently available storage product in the market?



C3D's Fluorescent Multilayer Disks and Cards

reading betwe

World Compact Disk and Optical Disk Drive Market

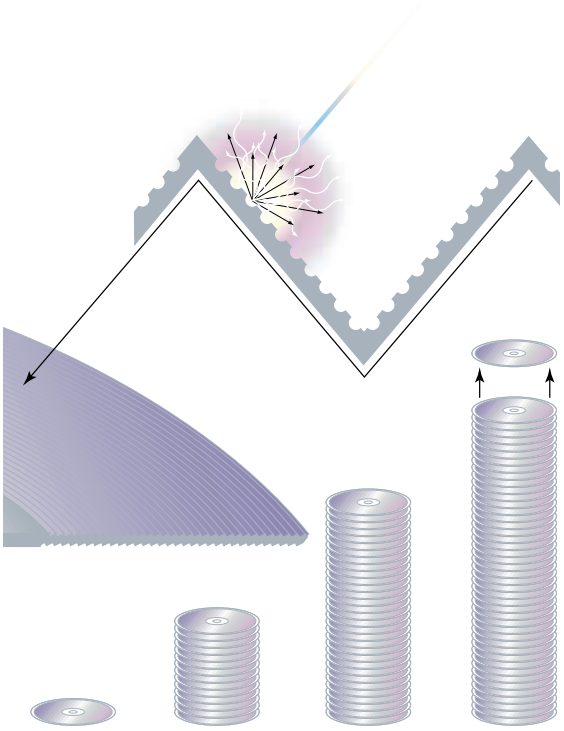


C3D, Inc. develops leading edge technologies and products to serve the growing data storage needs of customers in government, business, education, and consumer segments through continuous research and product innovation. By providing revolutionary, rather than evolutionary, new data storage solutions to its customers through joint ventures and licensing agreements, C3D intends to dominate the data storage research and development market, thus providing significant returns to its shareholders.

Consumers require more and more digital devices that allow them to read, write, and record greater volumes of digital data. Limitations in the memory capacity of CDs and DVDs arise from basic physical principles, and not from any technological difficulties. No amount of tinkering will be able to overcome these natural limitations, even with compression. The means to increased storage capacity of the CD or DVD is to make it 3-dimensional by adding additional layers upon the one active information layer while maintaining a standard disc of 1.2 mm thickness. However, conventional optical disk drive technology does not allow more than two layers, principally because of optical interference, noise, scatter, and cross-talk resulting from the fact that the probing laser beam and the reflected signal are of the same wavelength and the nature of the highly coherent reflected signal used. The signal degradation surpasses acceptable levels.

C3D, Inc. has developed a new technology that allows for the storage of huge amounts of information at a low cost with important advantages over current technologies. C3D has gone beyond the limits of presently existing 2-dimensional memory technologies. C3D's new technology implements the concept of 3-dimensional, volumetric storage of information. Data is recorded on multiple layers located inside a disk or a card, as opposed to the single or double layer method presently available in optical disks, CDs, and DVDs. This new technology uses a fluorescent material to store data in pits and grooves in each of the layers.

The cost per gigabyte of C3D memory will be at least one order of magnitude less than the corresponding most optimistically projected cost of magnetic and magneto-optical memory by 2001. At the same time the industrial manufacturing of C3D products will be simpler by comparison with manufacturing of all other known types of memory products.



widely used CD-ROMs hold 650 megabytes

2 layer DVD disks hold 9 gigabytes

new generation DVD disks will hold 20 gigabytes

C3D's FMDs (Fluorescent Multilayer Disks) will hold 140 gigabytes +

The concept of Fluorescent Multilayer Disks and Cards (FMD/C) is a significant and unique breakthrough – the recording, reading, and storing of information by using fluorescent materials embedded in pits and grooves, in each of the layers. Information is stored and retrieved using fluorescence of the media instead of reflection. Coherent and incoherent light is emitted once the fluorescence is stimulated by the laser light. Data is stored in the incoherent light. This fluorescent property enables writing and reading of multilayer structures with much greater storage capacity than offered by current optical memory products. Theoretical studies, now confirmed by experimental results, have shown that in conventional reflection systems the signal quality degrades rapidly with the number of layers. However, with fluorescent readout systems, the quality degrades much more slowly. C3D believes that up to 100 memory layers are feasible on a standard sized CD. The technology furnishes the user with unrestricted power over storage space and storage time, and delivers unique performance advantages. C3D has demonstrated for the first time ever within the storage industry pulse-diode lasers passing the crucial test of 10,000 hours continuous performance, a required standard for industrial applications.

een the lines

The technology is presently protected by over forty USA, Japanese, Far Eastern, and European patents, allowed and pending, dozens of priority establishing disclosures, and the exceptional know-how of an unprecedented group of physicists cooperating across the world.

The Products **C3D, Inc. has developed and proven the basic technology and will begin to develop end-user products over the next two years. With each of the following products, the company will seek and establish joint ventures with strategic partners who are already established with market share and manufacturing capabilities in the appropriate markets.**

The initial four products that will be developed by C3D are:

Standard 120 mm FMD ROM (Fluorescent Multilayer Disk, Read Only Memory) • These high capacity disks with 140 gigabytes of data are needed to satisfy the requirements of the HDTV market.

Microm WORM (Write Once Read Many) Microm WORM is a 30 mm recordable disk that can fit in any portable device. This technology will be applied to devices such as laptop and handheld computers, digital cameras, and video recorders and players. For laptop and handheld computers, it will offer lightweight, high capacity storage and quick access to data. For cameras and video players, Microm WORM will not only offer the same gains as for laptop and handheld computers but also offer higher quality video. This technology will be ideal for downloading information from the Internet.

The ClearCard (Read Only Memory and Write Once Read Many) • New generations of electronic devices gain market approval by increasing functionality and versatility, and by creating greater memory. A principal obstacle to the development of small portable appliances with large data storage capacity is the lack of inexpensive small size memory carriers that can store gigabytes of information. C3D, by using its Fluorescent Multilayer technology, allows such storage on credit card size carriers. Access and retrieval of information will be unmatched as to speed, allowing the data retrieval rate to exceed 1 gigabyte per second. For the first time in the history of optical storage, C3D's technology makes these systems possible and relatively easy to build. The systems will be resilient to all kinds of shocks and will be user friendly and inexpensive. The cards themselves will be extremely inexpensive, and therefore disposable. The applications for the memory cards are enormous, ranging from games and e-books to archival and navigational systems. The ClearCard will also be used in many current disk applications.

the business concept

While maintaining a focus on research and development of leading edge data storage technology, C3D will actively seek to enter into joint ventures with existing industry leaders to secure fast entry of Fluorescent Multilayer Disks and Cards (FMD/C) products into the market. C3D will cultivate strategic partners with an established market share and track record in the various segments of the data storage market. These strategic partners will manage the sales and marketing and manufacturing efforts for the products. C3D will realize revenues by licensing its technology to the joint ventures and other interested companies.

C3D Highlights

Increased Initial Capacity – 8 gigabytes on a small 30 mm disk (equivalent to 140 gigabytes on a regular size 120 mm disk) and 3 gigabytes in a credit card size carrier.

Quick Parallel Access and Retrieval of Information and Usage Flexibility – large information fields can be scanned and read simultaneously.

Removable Disks and Cards – as opposed to magnetic disks that are generally fixed (with magnetic disks, the consumer has to pay the cost of all of the electronics surrounding the disk).

Guaranteed Data Protection – prevention of unauthorized access because the disks may be removed from the system, and huge capacity reserves allowing for several tiers of smart encoding and the adoption of complex algorithms.

Ease of Operating and Manufacturing Tolerances – fewer restrictions in temperature range, vibration, and air-cleanness.

Huge Potential for Further Growth – the technology is young and physical limitations on capacity and retrieval speed are well beyond any current needs.

Extremely Low Cost per Information Bit – no more than a fraction by comparison with magnetic memory.

Unsurpassed Possibilities for Multilayered Card Technology – the cards will be read and played in very low cost video and audio players with no moving parts.

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