



Optics

High-Density Optical Data Storage System

Using an intense, ultra-small laser focal point, NASA researchers have enabled a high-density optical storage system

NASA's Langley Research Center researchers have developed a novel approach for a high-density optical data storage system to advance the typical capabilities of an optical data storage system. Operating at any laser wavelength from infrared (IR), visible, ultraviolet (UV), and X-ray regime, the NASA technology utilizes special beam focusing techniques to achieve extremely short focal lengths and ultra-small spot sizes. The technology could be used with any laser wavelength, from IR to UV, and soft X-ray regime can be adapted to take advantage of any optical media. The high density data storage capability is solely a function of the reduced laser/X-ray spot size.

BENEFITS

- Achieves ultra-small, intense laser beam focal point, smaller than the wavelength of the light used
- Actively programmable short focal length, approximately 100 microns or less, enables design of compact, durable optical data storage systems
- Can be used with dyebased optical media, phase change media, or photoluminescent media

technology solution

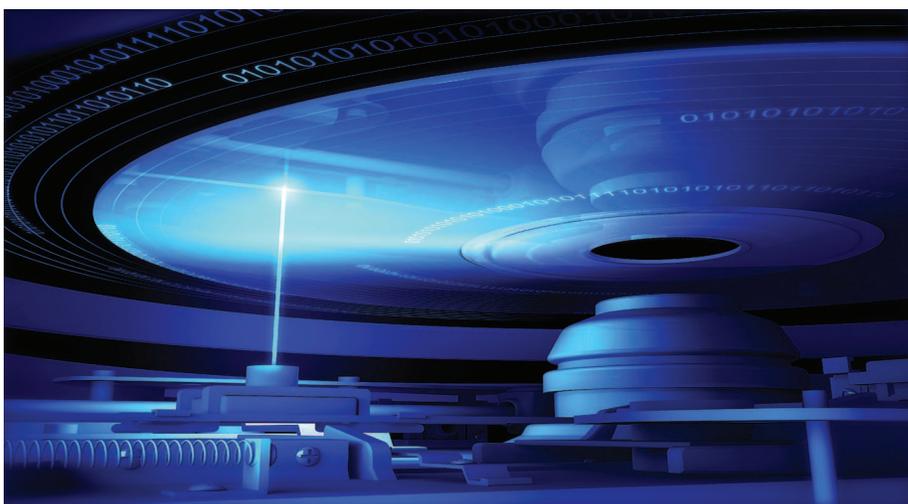


NASA Technology Transfer Program

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THE TECHNOLOGY

The NASA technology for the high-density optical data storage system is based on two known methods to manage beam focal length and spot size using interference methods. One of those focusing methods is an electro-optic micro zone plate developed at NASA, where the micro zone plate lens is constructed of an electrooptically active material that changes its index of refraction with applied voltage, thus creating what is essentially a programmable micro zone plate lens, with active control of the focal length/focal point spot size. Micro zone plates are used commercially in applications such as soft X-ray microscopes. The other beam focusing method is referred to as the Photonic DART method, also developed at NASA, using novel variations of the micro zone plate approach with varying heights of the rings able to achieve an even smaller spot size using destructive interference ring pattern, which is optimized with diffraction limit.



The NASA technology is applicable with CD and DVD data storage systems.

APPLICATIONS

The technology has several potential applications:

- CD and DVD data storage systems
- Any application requiring optical read or write with ultra-small spot size

PUBLICATIONS

Patent No: 8,018,815

National Aeronautics and Space Administration

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