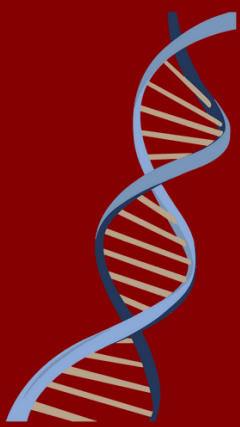


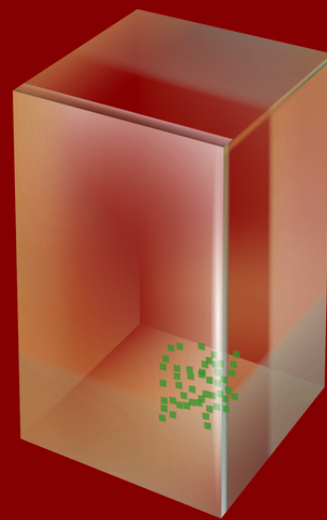
4 Unusual Emerging Data Storage Technologies



DNA



Glass



Holographic



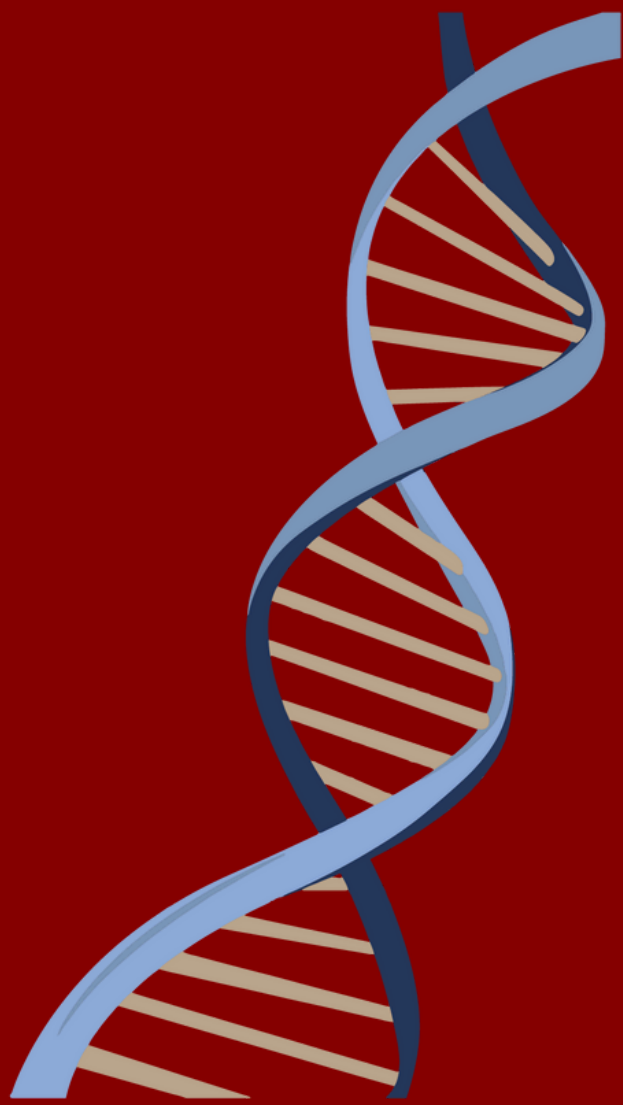
Ceramics





As the volume of new **data** rapidly grows, current storage technologies may struggle to keep up. Therefore, scientists worldwide are actively working on new radical **solutions**, experimenting with unconventional data storage mediums.

Here are four **emerging technologies** that could disrupt the operation of current data centres and become standard in the future.



DNA Data Storage

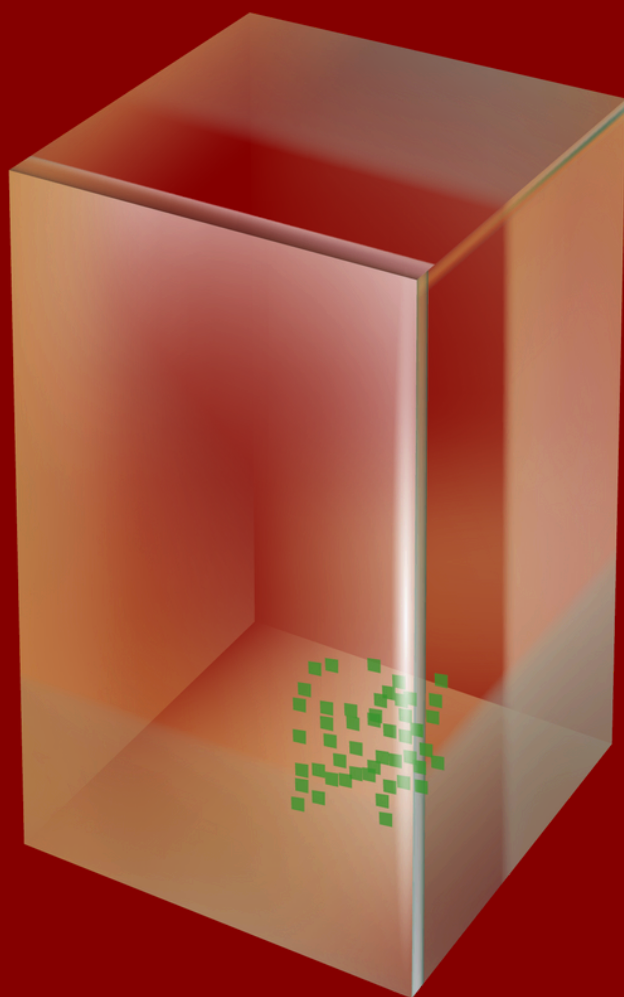
DNA data storage technology utilises the inherent information-storing capabilities of DNA. Digital data, represented as binary code (0s and 1s), is converted into DNA sequences (A, T, C, and G). This innovative method offers exceptionally high data density, with the potential to store vast amounts of data in a minuscule physical space, far surpassing traditional electronic storage media.

Additionally, DNA data storage possesses remarkable longevity, as DNA molecules can remain stable for thousands of years under appropriate conditions. The potential for very high-density DNA data storage holds promise for compact and long-term data retention.



Glass Data Storage

Glass data storage, often referred to as 5D data storage, employs ultrafast laser writing techniques to encode data into quartz glass. This method achieves exceptional data density and durability, with the potential to preserve information for 13.8 billion years without degradation. While still under research and development, significant progress has been made in increasing writing speeds and data capacity, making glass data storage a highly promising candidate for the long-term archival of critical information.



Holographic Data Storage

Holographic data storage is a cutting-edge technology that uses volume holograms to record data within a photosensitive medium. Unlike other optical storage mediums like CDs and DVDs that only record data on their surface, this approach offers substantial data density, as it utilises the entire volume of the medium creating a holographic image of the data. Although still in the developmental phase, research is advancing towards enhancing the stability, durability, and cost-effectiveness of this technology.



Ceramics Data Storage

Ceramics-based data storage technology uses thin glass with a dark ceramic layer as data storage media. Data is written by QR code-like patterns utilising a laser pulse. This technology leverages the inherent stability and resistance of ceramics to environmental factors such as heat, moisture, and chemical exposure, ensuring data integrity over thousands of years. Although currently in the experimental stage, advancements are being made in improving data encoding techniques and storage capacity, positioning ceramic data storage as a viable option for future-proof archival applications.



The EU-funded **PEARL-DNA** project aims to develop and assess a complete end-to-end chain of innovative solutions contributing to improving speed, accuracy, energy efficiency and costs associated with DNA digital data storage.

Learn more at www.pearl-dna.eu

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