

# 'Superman' crystals could store 360TB of data forever

Data can be kept in crystals that can resist temperatures of 1,000°C

By [Lucas Mearian](#), Computerworld | [Storage](#)

**July 15, 2013, 11:12 AM** — Researchers have been able to demonstrate the ability to read and write data using a five-dimensional recording process in a synthetic crystal to store massive amounts of data indefinitely.

The researchers, led by Jingyu Zhang from the University of Southampton in the U.K., successfully recorded a 300KB digital copy of a text file onto nanostructured glass in 5D using ultrafast and intense pulse laser. The file was written in three layers of nanostructured dots separated by five micrometers (five millionths of a meter).

The scientists used a femtosecond laser, which emits pulses of light in femtoseconds (one quadrillionth, or one millionth of one billionth of a second). The 5D read/write laser can record up to an estimated 360 TB/disc data capacity on nanostructured glass capable of thermal stability up to 1000C -- and a practically unlimited lifetime.

In a [statement](#) this week, the researchers called the glass the "Superman memory crystal," alluding to the "memory crystals" used in Superman films to store the planet Kryptonite's history and its civilization's collective knowledge.

The University of Southampton researchers recorded via self-assembled nanostructures created in fused quartz, which they said is able to store the vast quantities of data for more than a million years.

The information encoding comes in five dimensions that include the size and orientation in addition to the three dimensional position of these nanostructures.

According to [a recently published paper](#), the self-assembled nanostructures change the way light travels through glass, modifying polarization of light that can then be read by combination of optical microscope and a polarizer, similar to that found in Polaroid sunglasses.

A graphic depicting a 5D optical storage writing setup: femtosecond laser, spatial light modulator (SLM), Fourier lens (FL), half-wave plates matrix ( $\lambda/2$  M), dichroic mirror, 1.2 NA water immersion objective, silica glass sample, translation stage. (Image: University of Southampton)

The research was conducted as part of a joint project with Eindhoven University of Technology.

"We are developing a very stable and safe form of portable memory using glass, which could be highly useful for organizations with big archives," Jingyu said in a statement. "At the moment, companies have to back up their archives every five to 10 years because hard-drive memory has a relatively short lifespan.

"Museums who want to preserve information or places like the national archives where they have huge numbers of documents, would really benefit," he added.

This article, '[Superman' crystals could store 360TB of data forever](#), was originally published at [Computerworld.com](#).

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