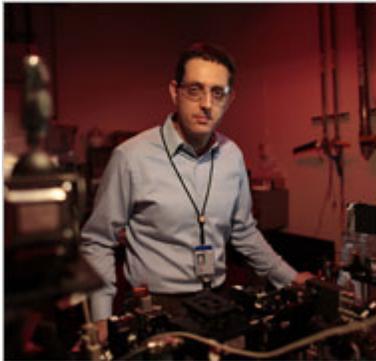


G.E.'s Breakthrough Can Put 100 DVDs on a Disc

By [STEVE LOHR](#)

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[General Electric](#) says it has achieved a breakthrough in digital storage technology that will allow standard-size discs to hold the equivalent of 100 DVDs.



Nathaniel Brooks for The New York Times

Brian Lawrence leads G.E.'s holographic storage program.

The storage advance, which G.E. is announcing on Monday, is just a laboratory success at this stage. The new technology must be made to work in products that can be mass-produced at affordable prices.

But optical storage experts and industry analysts who were told of the development said it held the promise of being a big step forward in digital storage with a wide range of potential uses in commercial, scientific and consumer markets.

“This could be the next generation of low-cost storage,” said Richard Doherty, an analyst at Envisioneering, a technology research firm.

The promising work by the G.E. researchers is in the field of holographic storage. Holography is an optical process that stores not only three-dimensional images like the ones placed on many credit cards for security purposes, but the 1's and 0's of digital data as well.

The data is encoded in light patterns that are stored in light-sensitive material. The holograms act like microscopic mirrors that refract light patterns when a laser shines on them, and so each hologram's recorded data can then be retrieved and deciphered.

Holographic storage has the potential to pack data far more densely than conventional optical technology, used in DVDs and the newer, high-capacity Blu-ray discs, in which information is stored as a pattern of laser-etched marks across the surface of a disc. The potential of holographic technology has long been known. The first research papers were published in the early 1960s.

Many advances have been made over the years in the materials science, optics and applied physics needed to make holographic storage a practical, cost-effective technology. And this year, [InPhase Technologies](#), a spinoff of Bell Labs of [Alcatel-Lucent](#), plans to introduce a holographic storage system, using \$18,000 machines and expensive discs, for specialized markets like video production and storing medical images.

To date, holographic storage has not been on a path to mainstream use. The G.E. development, however, could be that pioneering step, according to analysts and experts. The G.E. researchers have used a different approach than past efforts. It relies on smaller, less complex holograms — a technique called microholographic storage.

A crucial challenge for the team, which has been working on this project since 2003, has been to find the materials and techniques so that smaller holograms reflect enough light for their data patterns to be detected and retrieved.

The recent breakthrough by the team, working at the G.E. lab in Niskayuna, N.Y., north of Albany, was a 200-fold increase in the reflective power of their holograms, putting them at the bottom range of light reflections readable by current Blu-ray machines.

“We’re in the ballpark,” said [Brian Lawrence, the scientist who leads G.E.’s holographic storage program](#). “We’ve crossed the threshold so we’re readable.”

In G.E.’s approach, the holograms are scattered across a disc in a way that is similar to the formats used in today’s CDs, conventional DVDs and Blu-ray discs. So a player that could read microholographic storage discs could also read CD, DVD and Blu-ray discs. But holographic discs, with the technology G.E. has attained, could hold 500 gigabytes of data. Blu-ray is available in 25-gigabyte and 50-gigabyte discs, and a standard DVD holds 5 gigabytes.

“If this can really be done, then G.E.’s work promises to be a huge advantage in commercializing holographic storage technology,” said [Bert Hesselink, a professor at Stanford and an expert in the field](#).

The G.E. team plans to present its research data and lab results at an optical data storage conference in Orlando next month.

Yet, analysts say, the feasibility of G.E.’s technology remains unproved and the economics uncertain. “It’s always well to remember that the most important technical

specification in any storage device, however impressive the science behind it, is price,” said James N. Porter, an independent analyst of the storage market.

When Blu-ray was introduced in late 2006, a 25-gigabyte disc cost nearly \$1 a gigabyte, though it is about half that now. G.E. expects that when they are introduced, perhaps in 2011 or 2012, holographic discs using its technology will be less than 10 cents a gigabyte — and fall in the future.

“The price of storage per gigabyte is going to drop precipitously,” Mr. Lawrence said.

G.E. will first focus on selling the technology to commercial markets like movie studios, television networks, medical researchers and hospitals for holding data-intensive images like Hollywood films and brain scans. But selling to the broader corporate and consumer market is the larger goal.

To do that, G.E. will have to work with partners to license its holographic storage technology and expertise, and the company is already talking with major electronics and optical storage producers, said Bill Kernick, who leads G.E.’s technology sales unit. The holographic research was originally related to G.E.’s plastics business, which it [sold two years ago](#) to the Saudi Basic Industries Corporation for \$11.6 billion.

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