New RFID Tag Could Mean the End of Bar Codes

http://www.wired.com/wiredscience/2010/03/rfid/
By Lisa Grossman, Science News
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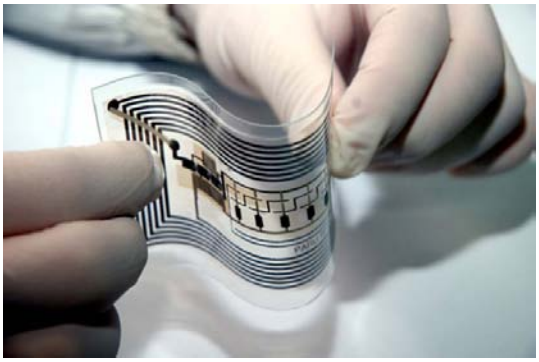
Note from Pastor Kevin Lea: This technology will not just lead to an end of bar codes, but it could also be the beginning of the end for privacy. If all goods are chipped, and the talk of chipping people also becomes a reality, then the government and marketers will know exactly what every person is buying. If society moves this deeply into electronic control and banking, then the government would also have a means of shutting off the buying and selling capability for anyone who is declared an enemy of the State. Could all of this be heading us toward the fulfillment of Revelation 13? It sure appears that way.

> *He causes all, both small and great, rich and poor, free and slave, to receive a mark on their right hand or on their foreheads, and that no one may buy or sell except one who has the mark or the name of the beast, or the number of his name. Here is wisdom. Let him who has understanding calculate the number of the beast, for it is the number of a man: His number is 666. (Revelation 13:16-18 NKJ)*



Lines at the grocery store might become as obsolete as milkmen, if a new tag that seeks to replace bar codes becomes commonplace.

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Researchers from Sunchon National University in Suncheon, South Korea, and Rice University in Houston have built a radio frequency identification tag that can be printed directly onto cereal boxes and potato chip bags. The tag uses ink laced with carbon nanotubes to print electronics on paper or plastic that could instantly transmit information about a cart full of groceries.

"You could run your cart by a detector and it tells you instantly what's in the cart," says James M. Tour of Rice University, whose research group invented the ink. "No more lines, you just walk out with your stuff."

RFID tags are already used widely in passports, library books and gadgets that let cars fly through tollbooths without cash. But those tags are made from silicon, which is more expensive than paper and has to be stuck onto the product as a second step.

"It's potentially much cheaper, printing it as part of the package," Tour says.

The new tag, reported in the March issue of *IEEE Transactions on Electron Devices*, costs about three cents to print, compared to about 50 cents for each silicon-based tag. The team hopes to eventually bring that cost below one cent per tag to make the devices commercially competitive. It can store one bit of information — essentially a 1 or a 0 — in an area about the size of a business card.

That's not much compared to computer chips, but Tour says this tag is just a "proof of concept." Study coauthor Gyoujin Cho of Sunchon National University, along with a team from the Printed Electronics Research Center of the Paru Corporation in Suncheon, Korea, are working to pack more transistors into a smaller area to ultimately squeeze 96 bits onto a 3-square-centimeter tag. That would be enough to give a unique identification code to each item in a supermarket, along with information like how long the item has been on the shelf, Tour says.

The tags were made possible by the creation of semiconducting ink, which contains carbon nanotubes that will hold an electrical charge. A transistor needs to be completely semiconducting to hold information, Tour says. If there are any bits of conducting metal — which moves electric charges around easily — mixed in, the information-holding charge will leak out quickly.

The mixture of nanotubes created in Tour's lab includes both semiconducting nanotubes and conducting nanotubes. Separating out the conducting nanotubes is "a horrid experience," Tour says. "They're very painful to separate." So instead, the team devised a way to coat the conducting nanotubes in a polymer to protect the electric charge and allow the ink to be purely semiconducting.

Once they had the ink, Cho and his colleagues built roll printers to transfer ink to the final material. The tags are printed in three layers, and one of the remaining hurdles to making the tags store more memory in less space is to improve the alignment of those layers, Cho says.

"The work is impressive," comments Thomas N. Jackson of Penn State University in University Park, who is also developing flexible electronics. He thinks it will be difficult to compete with silicon, which is well established in the realm of consumer products packaging. But similar technology could be used to do things silicon can't do, he says, such as make smart bandages that can sense infections or freshness-sensing food packaging.

And for those who would rather not have their food broadcast radio waves after getting it home, fear not. Tour says the signals can be blocked by wrapping groceries in aluminum foil.

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