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Foiling the Counterfeiters

It is difficult staying ahead of counterfeiters because the equipment needed to produce security tagging (holograms, micro printing, threads, etc.) keeps dropping in price. Nineteen years ago, my “Technology Today” column described

and sunglasses, they also produce fake drugs, toys, and other items whose ingestion or other physical contact can cause harm. Counterfeiters often replace more expensive materials with cheap substitutes, leave out active ingredients, and/or

is wide and therefore way too small to be seen without strong magnification. If these microparticles were added to U.S. currency, they would be scattered around each bill as shown in Photo 1. However, the illustration is an exaggeration because you wouldn’t be able to see them without strong magnification.

To go beyond simple security tagging, scientists developed a system that can place up to six different color bands on each microparticle. The designer particle for a particular item can then be quickly mass produced to meet a manufacturer’s needs. Since the coding is a barcode, it can also supply all kinds of information about the tagged item.

Verification equipment, perhaps similar to a barcode reader in a supermarket, will be needed to see and read these tiny barcode tags. To see them, you need an infrared source of light and 20X magnification. We can expect that the next generation of smartphones will be equipped with the light, lens magnification, and an app that can tell you what the barcode says. (See Photo 2.)



Photo 1—The particles sprinkled on the surface of this \$100 bill are supersized so you can see them. If used as a future security device, their barcode properties will not only say what the product is but could also tell you when it was made and other facts.

the best technology that the 20th century had to offer to keep U.S. currency safe from extremely well-funded counterfeiters.

You might find it fascinating comparing what the U.S. Treasury used back then with what they are doing today. You can find a copy of my December 1995 column online at www.technologytoday.us/PastColumnPDFs/5_US_Money_Goes_High_Tech.pdf. To see the current upgrades to our U.S. currency go to: www.newmoney.gov/currency/default.htm and click on the photo caption “Explore the Interactive Note”.

I’m sorry to report that what was good enough in the past to foil counterfeiters will continue to need upgrading in the future. It’s sad to report that just about every imaginable product can become a counterfeiter’s target. They not only produce fake expensive designer purses

use dangerous chemicals and lead paints in the production of their knockoffs.

The newest security measures sound a great deal like a subplot in a science fiction movie. In a joint project, researchers at MIT and Lincoln Labs have recently developed a security particle that is infinitesimally smaller than current security systems. Their new polymer microparticles are made up of tiny differently colored crystals. Each of these individual pieces is only as long as a human hair



Photo 2—A future smartphone might let you act as a detective. An app could read the microparticles that are made visible by the phone’s infrared light and 20X magnification.

The polymer substrate of these micro-particles is strong enough to handle the temperatures found in many manufacturing processes, including 3D printing, and they can be added to printing inks for use in all printing processes. In many cases, they will be added to the products themselves and when appropriate—for example in the case of medicines—added to the packaging.

Counterfeiters

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Joseph Xu



Photo 3—The label shown has an invisible watermark design that will show when you blow moist breath on it.

have another new security technology to worry about. In a joint project, funded by the National Science Foundation (NSF) and the Defense Advanced Research Projects Agency (DARPA), researchers in South Korea working with researchers at the University of Michigan have created a new type of anti-counterfeiting label. Their labels have an invis-

ible watermark design that will show up when a person blows his or her moist breath on the label. (See Photo 3 and a related video at www.youtube.com/watch?v=P7WihOqAvSA.) These new types of labels can be pasted on different types of surfaces and they are very tough, so they can't easily be damaged.

Both of these new technologies attempt to prevent duplication by creating an item that at this time is technically beyond the capabilities of counterfeiters to reproduce. How long they will stay viable is a question that can only be answered in the future.

Recalling the Facts

1. Why does the U.S. government keep adding new anti-counterfeiting systems to our printed money?
2. What do you see as the strengths and weaknesses of the new security technologies described in this column?
3. Which one do you see as superior? Why? ©

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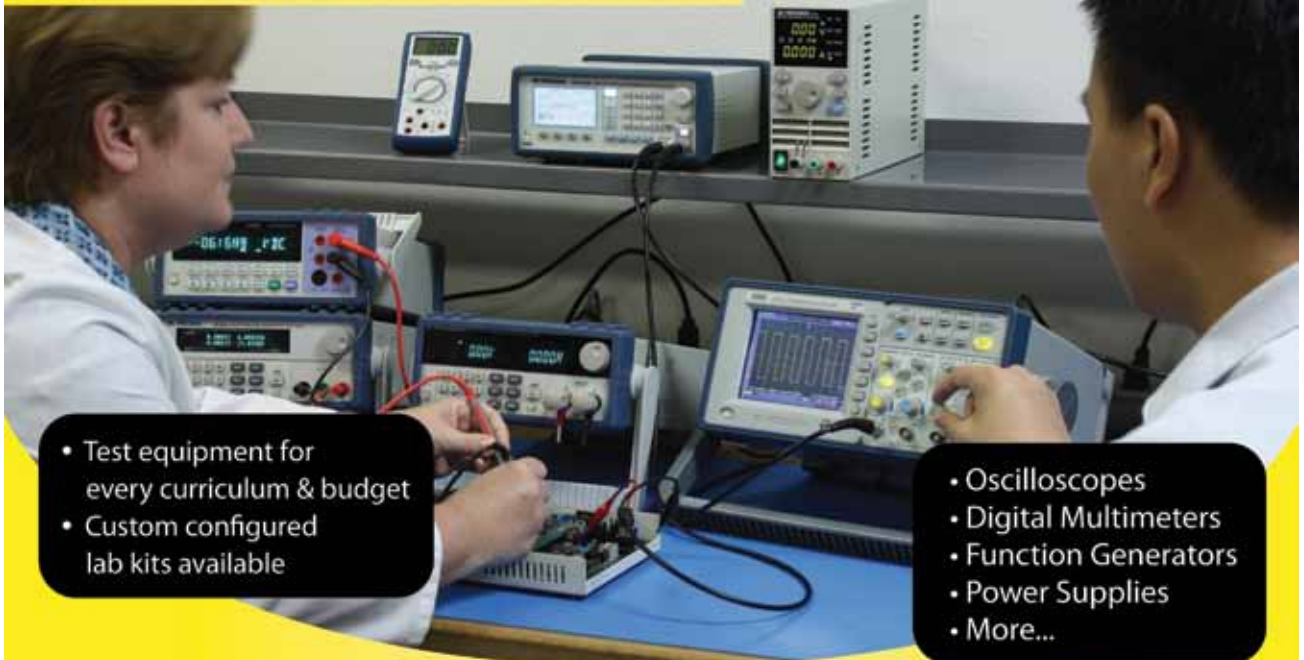
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