

**BIZfact**

**\$28,220**

Median annual wage of Long Island's 890 short-order cooks

SOURCE: New York State Labor Department

**ASIANS URGED TO REGULATE BITCOIN**

TOKYO — A senior U.S. Treasury official touring Asia has urged banks and financial regulators in the region to do more to tighten oversight of booming trading in bitcoin and other cryptocurrencies.

Sigal Mandelker, the Treasury undersecretary for terrorism and financial intelligence, said Friday that more needs to be done to prevent money laundering and other criminal activities using such transactions.

Speaking to reporters in Tokyo after visiting China, Hong Kong and South Korea, she lauded recent moves to keep closer tabs on such dealings.

"We feel very strongly that we need to have this kind of regulation all over the world," Mandelker said. She noted that Japan and Australia are already regulating cryptocurrency trading.

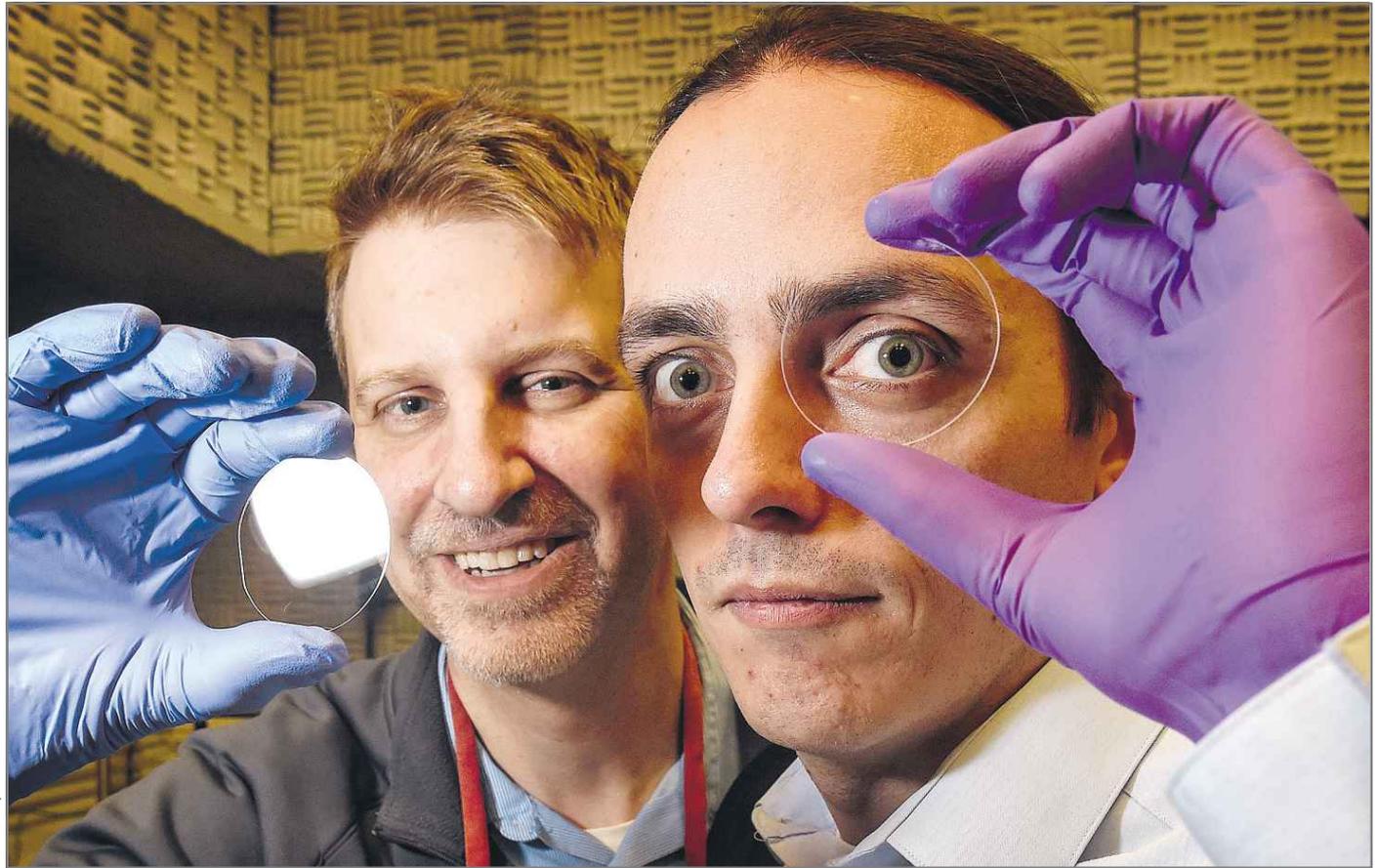
"The EU, I understand, is moving very quickly in that direction, and we think it's very important that similar regulations are happening in a number of other countries."

Mandelker recently told Congress that money laundering related to cryptocurrencies was "an area of high focus" for the Treasury Department.

The United States started regulating such transactions in 2013 and considers traders and administrators of cryptocurrencies as "money transmitters" who are required to have strong anti-money laundering and other controls to prevent their use for illegal purposes, she said. It has imposed fines for violations of those regulations. — AP

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NEWSDAY / THOMAS A. FERRARA

Brookhaven National Lab research co-authors Charles Black, with regular glass, and Andreas Liapis, with nonreflective "invisible glass."

Looking through 'invisible glass' at . . .  
**Spectrum of potential**

Scientists hope to patent process with practical applications

BY KEN SCHACHTER  
 kenneth.schachter@newsday.com

Scientists at Brookhaven National Laboratory have created "invisible glass" that eliminates nearly all glare and potentially could find uses in eyeglasses, smartphones, solar panels and auto windshields.

The glass is virtually invisible because it transmits nearly 100 percent of light across a broad spectrum, including wavelengths visible to humans, said Charles Black, lead researcher and director of the laboratory's Center for Functional Nanomaterials.

Black said the assembly process, which creates a "nanotexture" of tiny cones just bil-

lionths of a meter tall on the glass, potentially could be adapted for large-scale production. Manufacturers of glass and eyeglasses already have extended feelers to learn about the technology, he said.

Black was the lead author of an Oct. 30 article on the breakthrough in the journal Applied Physics Letters. Brookhaven Science Associates, the company founded by Stony Brook University and Columbus, Ohio-based Battelle, which runs BNL for the U.S. Department of Energy, has applied

for a patent on the process.

The article points out that glass with the nanotexture can improve the performance of solar cells by letting them harvest the light typically lost through reflection.

Andreas Liapis, a co-author on the BNL research team and now a research fellow at Massachusetts General Hospital's Wellman Center for Photomedicine, said a standard piece of glass reflects about 8 percent of light and transmits the other 92 percent.

By contrast, he said, glass

etched with the cones transmits 99.7 percent of light.

Glass reflections arise when light passes from one medium to another. Black said the tiny cones "soften" the transition of light as it travels from air to glass.

The cones are able to usher light into the glass because they are smaller than the wavelength of light, which is about 400 to 700 nanometers.

Because the cones are smaller than a lightwave, Black said, "the light won't see the individual structure" of the cones and bounce back as a reflection.

The transition takes place at nanoscale dimensions. For perspective, a nanometer is one billionth of a meter and a grain of sand is about 250,000 nanometers in diameter. The cones are 250 nanometers tall and 50 nanometers wide, so

**FAST FACTS**

- **STANDARD GLASS** reflects 8 percent of light and transmits the other 92 percent. "Invisible glass" developed at Brookhaven National Laboratory transmits 99.7 percent of light.
- **TO MAKE THE GLASS** non-reflective, it is etched with tiny cones 1,000 times smaller than a grain of sand.
- **THE GLASS COULD BE** used in eyeglasses, smartphones, solar panels and auto windshields.

See GLASS on A30

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## LI BUSINESS

'MARRYING'  
NANOSCIENCE  
TO TECHNOLOGY

GLASS from A29

they're more than 1,000 times smaller than a grain of sand.

The researchers used equipment to etch the glass that's similar to that used in producing computer chips.

"We've married the world of nanoscience to create these small features from machines used to make technology around us, in particular semiconductors," Black said.

They use a template, or stencil, to define where the cones will be on the glass and then stream a very hot gas, known as plasma, to etch the pattern.

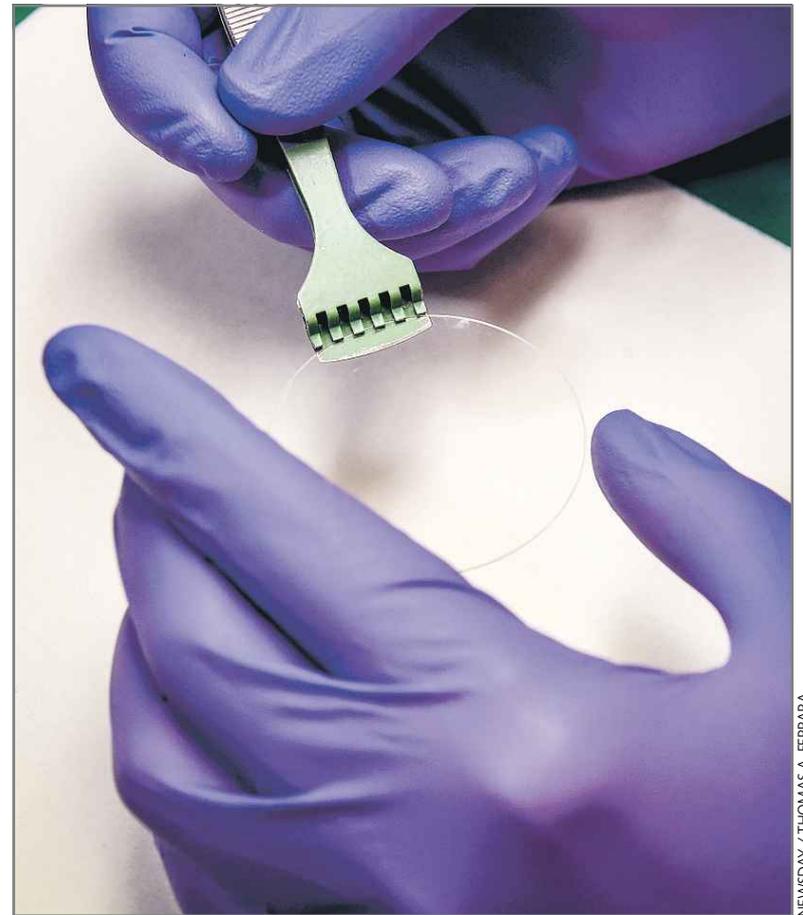
The applications for the technology are wide, Black said, in part because glass itself comes in so many forms.

"If you throw other things into glass, you can make it more bendable or heat-tolerant," he said.

Black and other researchers have turned for inspiration to nature, in particular the structure of moth eyes, which are covered with nanoscale posts.

"The moth is a nighttime animal that needs to collect as much light as possible in low-light conditions," Black said. In addition, the non-reflective eyes shield nocturnal moths from predators that could be alerted by a reflection.

Black said that his group is not the first to create mothlike structures to cut glare. Others have cre-



The "invisible glass" developed at Brookhaven National Lab is made by etching nano-size cones onto glass using a stream of hot gas called plasma.

ated coatings to apply to glass.

But, Black said, the nanotextures "perform more than twice as well" as broadband anti-reflection coatings in reducing glare and more than three times as well when the light hits the glass at an angle.

Further, the technique could be used to produce the glass economi-

cally outside the laboratory, he said.

"The next step for us is to find the right partners."

A third co-author was Atikur Rahman, a former researcher at the laboratory and now an assistant professor in the department of physics at the Indian Institute of Science Education and Research in Pune, India.

## Slump in tourism to U.S. expected to wane

The Associated Press

Despite a slump in international tourism to the United States in the last two years, the U.S. Department of Commerce on Friday released a report forecasting an 18.5 percent growth in international visitation through 2022.

A chart from the department's National Travel and Tourism Office forecasts growth every year through 2022. Projections expect increases from last year's 75.1 million international visitors to 78 million this year, 80.9 million next year, 83.4 million in 2020, 86.2 million in 2021 and 89 million in 2022.

The chart shows international visitation to the United States grew steadily every year from 2009 to 2015, when arrivals numbered 77.5 million. But there was a drop in

2016 to 75.9 million, followed by a drop in 2017 to 75.1 million, though the report said last year's number is still being finalized and could change.

The department said the forecast is based on economic, demographic and social factors, historical visitation trends and other sources.

The U.S. travel industry this month launched an effort called the Visit U.S. Coalition to try to reverse the current slump in visitation.

"This latest report aligns with the trend that we were already seeing, which shows that the U.S. is not as competitive today as it was two years ago in the global travel marketplace and we are losing market share to other countries," said Roger Dow, CEO of the U.S. Travel

Association, which spearheaded the Visit U.S. Coalition.

The coalition expressed concerns at its launching that policies and anti-foreigner rhetoric from President Donald Trump's administration were dampening America's appeal as a travel destination.

Dow added that the Visit U.S. Coalition "looks forward to working with the Trump administration to address this problem, which has considerable ramifications for the broader U.S. economy."

Trump, a Republican, has made cracking down on immigration a centerpiece of his presidency and has promised to build a wall between the United States and Mexico to keep immigrants and drugs out. He has said his policies are meant to keep the U.S. safe.