

Pound/Euro 0.8013 ▲ 0.08%

Yen/\$ ¥102.46 ▼ 0.02%

Global Dow 25727.3 ▲ 0.30%

Gold 1313.90 ▲ 0.08%

Oil 95.58 ▼ 2.06%

3-month Libor 0.2310

10-year Treasury ▲ 9/32 yield 2.400%



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New iPhone: Sapphire Screen, Costlier

By DAISUKE WAKABAYASHI

Apple Inc. created the blueprint for a smartphone when it covered the touch screen of its first iPhone in glass, instead of plastic. Now, it is betting \$700 million that sapphire, a harder and more expensive material, can replace glass and better protect future devices.

The first sapphire display screens for the forthcoming larger iPhone and smartwatch are expected to roll off production lines this month at a Mesa, Ariz., facility that Apple opened with materials manufacturer GT Advanced Technologies Inc. At full capacity, the plant will produce twice as much sapphire as

the current output from the nearly 100 manufacturers world-wide, says Eric Virey, a senior analyst at French research firm Yole Développement.

"Nobody has ever invested this much money on sapphire," Mr. Virey says.

GT and Apple are producing synthetic sapphire, designed to replicate the properties of one of the hardest minerals on earth. Sapphire doesn't crack or scratch as easily as glass. It withstands high temperatures and resists chemical corrosion.

Manufacturing synthetic sapphire is costly, so the material has been used sparingly, to protect against extreme conditions in air-

plane windows or as a scratch-resistant cover for expensive watches.

Apple already uses sapphire to cover the iPhone's camera lens and fingerprint reader. But broader use of the material could ease another big headache: damaged phone screens. SquareTrade, which offers warranties for damaged screens, estimates that 11% of iPhone owners have devices with cracked or broken screens.

Analyst Mr. Virey estimates that a sapphire screen could cost \$16 to produce, compared with about \$3 for Gorilla Glass, Corning Inc.'s heavy-duty glass used in today's iPhones.

Apple and GT declined to com-

ment for this article.

Apple is considering using sapphire screens in more expensive models of the two new, larger iPhones it plans to debut this fall, if it can get enough of the material, people familiar with the matter say. Some analysts expect Apple to charge more for the phones than previous new models, because of increased component costs.

If the use of sapphire leads to fewer broken screens, Apple may save money in warranty costs. But Bernstein Research analyst Toni Saccomaghi says those savings likely wouldn't offset sapphire's higher cost.

If Apple doesn't raise prices, the

higher cost could erode the iPhone's profit margins, says Matt Margolis, an analyst at PRT Research and a GT investor. He says Apple may be willing to absorb the hit to separate its products from those of rivals.

Apple has invested heavily in components to make its products stand out. It designed its own 64-bit processor for mobile devices, helping the company leapfrog competitors. The Cupertino, Calif., company acquired AuthenTec Inc., a maker of fingerprint-sensor technology, in 2012 and last year introduced a fingerprint reader in the iPhone 5S. For sapphire, Apple last year bought the 1.4-million-square-foot

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Compound annual growth in premiums in decade through 2012



Canada

9.8%

France

7.6%



China Arts



THE PEOPLE'S MONEY
By Wei Gu

BUSINESS & FINANCE



Reuters

Apple is considering using sapphire screens in more expensive models of the two larger iPhones it plans to debut this fall.

New Sapphire Screen Is Costlier

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Arizona facility—about the size of two dozen football fields—from a solar-panel producer for \$113 million and leased it to GT, a leading maker of furnaces used to produce sapphire.

In November, Apple agreed to prepay GT \$578 million to outfit the factory with cutting-edge furnaces. GT is operating the factory to produce sapphire exclusively for Apple.

GT Chief Executive Tom Gutierrez told analysts last week that the Arizona facility was nearly complete and was starting the transition to high-volume production. He said the plant wouldn't reach full operational efficiency until early next year. GT said it expected Apple to pay the last of its four prepayments, of \$139 million, by the end of October, contingent on GT meeting certain operational targets.

Sapphire is scratch-resistant. But it isn't clear if the material will better protect against screens breaking, since sapphire's strength depends on its thickness and cut. Sapphire also is denser than glass, which will add to the phone's weight.

including sapphire, in tests in which screens are dropped from different heights. It also says Gorilla Glass reflects less light than sapphire, making the glass easier to view in sunlight.

A few small smartphone manufacturers have already introduced handsets with sapphire screens. Britain's Vertu Corp., which makes luxury phones costing more than \$10,000, has two models with sap-

Apple's broader use of the hard sapphire material could ease a big headache: cracked or broken phone screens.

phire screens. Japan's Kyocera Corp. introduced the Brigadier, a phone that the company says is virtually scratchproof.

Natural sapphires are gem varieties of corundum, a crystalline form of aluminum oxide. Impurities such as copper or magnesium

such impurities, sapphire is clear.

Mass-producing sapphire is complex. Sapphire crystals are grown in massive furnaces at high temperatures. After the ingredients crystallize in an energy-intensive process, the result is a giant hockey-puck-shaped cylinder called a boule, which is carved into different shapes. Apple's Arizona plant is using next-generation furnaces capable of producing boules larger than 440 pounds.

By forming boules more than 50% larger than produced by current machines, Apple and GT aim to drive down the price of sapphire and close the gap with glass.

"Before the Apple investment, I would have said sapphire is a great material with great potential but it's a few years out from becoming a market reality," says Vinita Jakhnawal, director of mobile and emerging display technologies at research firm IHS Technology. "But Apple has invested a significant amount, so it would be fair to say that the company probably expects a return on its investment pretty quickly."

—Lorraine Luk, Fox Bus