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Gem War

The diamonds pictured below are real -- only they cost about 15% less than other stones of similar size and quality. The reason: They were produced in a lab. How a new generation of high-quality diamonds is shaking up the jewelry world.

By VANESSA O'CONNELL
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Robert Amoroso learned the jewelry business from his dad and spent more than 700 hours in a classroom to become an expert on precious stones. On a recent afternoon, he eyed three gems. One was a diamond. Another was cubic zirconia, a common and relatively inexpensive diamond substitute. The third was something new: a gem-quality diamond produced in a laboratory.

Craig Cutler

The cubic zirconia stood out easily to the naked eye -- but Mr. Amoroso couldn't immediately tell the other two stones apart. Only after inspecting them under a microscope did he note an inscribed serial number that betrayed the origins of the lab-produced diamond.

"It's scary," said Mr. Amoroso, owner of Amoroso Jewelers, a retail and design shop in Boston's Jewelers Exchange Building. "I knew it could be done, but I just hadn't seen one yet." He pronounced the lab-grown diamond "the best of the three," noting that the natural diamond had more flaws.

The $143 billion jewelry business -- and the would-be fiancés, Valentines and lovers of bling that it caters to -- are facing a shakeup. Lab-produced diamonds, once suitable only for industrial use, are being produced with color and clarity that match -- or exceed -- the quality of diamonds dug out of the earth. These lab-made diamonds have begun trickling into retailers at prices below those for natural diamonds of similar size and sparkle.

The diamond establishment is gearing up to persuade consumers that natural stones are worth paying more for. It's an arguably vulnerable time for traditional producers; mined diamonds have suffered a wave of negative publicity (including the recent movie "Blood Diamond") for financing conflict in Africa. De Beers, which has long controlled the world's diamond supply, has stepped up its marketing of natural stones.

The industry is trying to persuade the Federal Trade Commission that lab-grown diamonds should be prohibited from using the term "cultured" and suggests, among other things, "synthetic." And DeBeers is loaning machines it says can distinguish between the two types to the most powerful gem-testing labs around the world. The technology helps DeBeers position lab-produced diamonds as synthetics that don't compete with natural stones.

It's "essential that synthetics are readily detectable from diamonds and that clear, unequivocal language is used to describe these man-made products," says Lynette Gould, a De Beers spokeswoman.

Tiffany and Co., one of the most prominent retailers of diamonds, says it has no plans to sell lab-produced stones in its stores. "They don't fit in our stores," says Mark Aaron, vice president of investor relations at Tiffany. "Natural diamonds fit in our stores -- diamonds that come out of the ground."

Producers say they aren't concerned. "As the business develops and people become more aware of cultured diamonds, the public will demand them," says Robert Linares, chairman of Apollo Diamond, a Boston-area maker of lab-produced diamonds.

These gems are still in their infancy, with only a handful of companies producing them and turning out relatively small numbers of stones for now. But unlike cubic zirconia, which is a chemically different substance, the lab gems are considered true diamonds, not fakes. Earlier this month, the Gemological Institute of America, which had long refused to grade them and other diamond alternatives, began offering to do so.

The long-term threat to established diamond producers: that mined diamonds could suffer the same fate as naturally occurring pearls. Cultured pearls, made when a small bead is inserted into a mollusk and grown, destroyed the natural pearl industry. Cultured pearls now account for more than 95% of all pearls sold globally, according to estimates by Gem World International, a research firm.

WHAT TO LOOK FOR IN LAB-MADE GEMS

• **See how the stones stack** up, in a graphic comparing of natural and lab-made diamonds and cubic zirconia, along with a sampling of some popular jewelry styles on the market.

• vOnly a small number of designers are incorporating lab-grown diamonds into their styles now. If you're looking for cutting-edge designs and want them made with lab-grown diamonds, you might have to buy loose lab-made stones and work with a designer.

• Ask for a grading report, particularly when buying a gift. That way you'll know exactly what you've purchased -- and you'll be able to explain it to your loved one.

• Carat sizes are growing as production of colorless varieties improves. Stones of one carat or more are expected to be at retail stores midyear.

The basic technology to produce diamonds in a lab has been around since the 1950s, when General Electric started making what are called industrial diamonds used in cutting hard substances such as stones, ceramics, metals and concrete. De Beers itself has an equity interest in a leading manufacturer of these stones, which are typically too small and flawed for use in jewelry. As the technology has evolved, companies learned how to make high-quality diamonds tinted in colors such as yellow, orange and pink (the colors result from an addition or elimination of certain impurities in the carbon). But producing gem-quality colorless diamonds, the most popular variety for jewelry, was too complicated.

In jewelry, colored diamonds, which are relatively rare in nature and therefore high-priced, have actually caught on in popularity recently. But colorless diamonds are still the staple for everything from rings to earrings and bracelets.

To make its gems, Apollo Diamonds exposes shirt-button-sized diamond fragments known as seeds to carbon particles, which latch onto them under high temperatures. Diamonds then start to form, one crystal at a time. A look through the window of one of the lab's submarine-like machines reveals two dozen glowing chips that will grow to be one carat in about two weeks. Apollo can now use its own stock of small diamond chips as seeds, rather than relying on seeds from mined diamonds.

In Sarasota, Fla., competitor Gemesis relies on high pressures to mimic what happens underground. Its machines essentially crush carbon under 58,000 atmospheres of pressure at 2,300-degrees Fahrenheit until the material crystallizes into yellowish or orange diamonds.

For now, the producers with the equipment to consistently turn out gem-quality stones are in the U.S., which is why they're first appearing in retail outlets here. Though the lab-grown diamonds are true diamonds, white ones especially differ in minuscule ways that aren't apparent to the eye but can be

detected with equipment. For example, because there's virtually no nitrogen in Apollo's stones, they tend to be more transparent in ultraviolet light than all but the rarest mined stones. Under more powerful, short-wave UV beams, they tend to emanate a strong blue to orange fluorescence.

The Wall Street Journal asked the GIA lab in New York to analyze a 0.22-carat Apollo-made diamond. The lab determined that the stone was a synthetic diamond of high clarity and almost flawless. "That's pretty pure for a synthetic of this type," says Tom Gelb, a supervisor at the lab.

Late last year, Apollo started selling jewelry directly to consumers and through a jeweler in Boston, near its hometown. This year, it hopes to increase production of large stones, while expanding distribution to other jewelers and selling online.

Both Gemesis and Chatham Created Gems, in San Francisco, make lab-produced colored diamonds that are also showing up online and in jewelry stores around the country, sometimes mixed with natural diamonds.

Randy McCollough, who owns 97 Samuels Jewelers stores in states such as California, Texas and Pennsylvania, began selling Gemesis diamonds in October, in some cases mounting them in existing settings. "It took a long time for everyone to accept cultured pearls, but look where they are today," he says. "Plus, at the end of the day, it's a diamond."

Last year, 400,000 carats were produced in the U.S. for gem use, compared with 130 million carats mined annually around the world. But man-made diamonds are gaining legitimacy. The Gemological Institute of America's new ratings will work just like those for natural diamonds, grading them according to color, clarity and cut. However, the reports will describe the stones as "laboratory grown."

Mindful of the collapse in pearl prices that followed the introduction of cultured pearls, Apollo has set the prices for most of its stones at 15% below that of mined diamonds, a figure it says it set after interviewing customers in focus groups. But its pricing structure could change as competitors perfect their own colorless diamond-making techniques.

In the complaint to the FTC, the main diamond associations noted that natural diamonds are a diminishing resource and therefore prices tend to rise each year. As technology improves, the petition said, the supply of lab-produced diamonds "presumably will increase, thereby increasing the price differential."

Citing three separate consumer surveys, the trade groups say that people think of "cultured" as a natural growth process with some human intervention that results in products that are superior to synthetics."

In the eyes of Gemesis founder Carter Clarke, "cultured" is an appropriate label for lab-grown diamonds since they are chemically the same as natural diamonds. Similar to the way cultured pearls are engineered by man, labs recreate nature's process to make diamonds. Gemesis uses the terms "cultured" and "laboratory-grown" to describe its diamonds. Producers oppose the term "synthetic," which they say implies that their diamonds are fakes.

The debate falls into a gray area of the law. The FTC says it is deceptive to call a man-made diamond a "diamond," but offers no opinion on the question of calling it a "cultured diamond." The FTC hasn't yet responded to the recent Diamond Association complaint.

Meanwhile, De Beers, creator of the "Diamond Is Forever" ad campaign, has ramped up its advertising of the virtues of mined diamonds. While it doesn't explicitly acknowledge the existence of lab-grown diamonds, De Beers extols the permanence of natural diamonds and attempts to make them seem special. They're "billions of years in the making," it says on its diamond information Web site, adiamondisforever.com. "Adding to the mystery and aura of what make diamonds so sought-after" is the

fact that "approximately 250 tons of ore must be mined and processed in order to produce a single, one-carat, polished, gem-quality diamond."

"De Beers is confident that synthetics will not have the same emotional and financial value as diamonds because the value of diamonds is inextricably linked to how they were naturally formed billions of years ago," Ms. Gould, the DeBeers spokeswoman says.

Overall, many expect prices for natural diamonds, especially bigger, better quality stones, to increase as at least 100 million new diamond consumers from India and China enter the market over the next five years. Despite the expected surge in demand for natural diamonds, production in carats over the next five years is expected to remain flat, according to Martin Rapaport of the Rapaport Diamond Report, which analyzes the diamond market.

The larger question is whether lab-grown diamonds will gain acceptance with consumers -- or whether they will be tagged with the stigma of cubic zirconia and moissanite, both of which simulate the look of diamonds and have declined in price since their arrival on the market.

Right now, lab-produced diamonds are benefiting from a backlash against natural diamonds. And they're starting to find an audience with some celebrities who want to make a statement.

Actor Terrence Howard, for instance, says he plans to wear a custom-designed pin with several "flawless" lab-produced colorless diamonds when he takes the stage as an Academy Awards presenter next month.

On the red carpet, he says he plans to talk about how they were made in Apollo's lab and are devoid of ethical and environmental concerns raised by diamonds that are mined. Mr. Howard, who says he approached Apollo and isn't getting paid by the firm, is borrowing it for the event. They're diamonds, he says, but consumers "can be sure nobody was harmed in the process of making it."

Albert Park, who bought his wife a pair of lab-produced diamond earrings for $800 last month with part of the signing bonus he got from his new job at a biotech startup in Mountain View, Calif., stumbled across them in an Internet search. His interest, he says, was partly driven by "heightened awareness of blood diamonds and the DeBeers cartel grip on diamond pricing." But he says the stones are "absolutely gorgeous" and his wife is very happy with them -- though she would have preferred them to be larger.

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How the Stones Stack Up

Below, a price comparison of natural and lab-made stones and cubic zirconia, the most widely available fake, along with a sampling of some popular jewelry styles on the market now.

—Vanessa O'Connell and Loretta Chao

COLORLESS STONES

Natural
Prices have been rising for this classic diamond, especially for larger stones. Prices range from $6,800 to $9,100 per carat, depending on the quality and cut.

Lab-Made
One-carat stones are expected to hit the retail market mid-year. Some have fewer flaws than natural diamonds. Half-carat stones run $900 to $2,250, depending on the quality.

Cubic Zirconia
Lots of sparkle but chemically different from diamonds and often spotted as fakes. Another diamond simulant: moissanite. A one-carat-sized cubic costs $5 to $15.

COLORED STONES

Natural
Yellow, pink and blue diamonds are popular now, but their rarity makes them pricey, from about $9,000 a carat for some yellows to $100,000 a carat for pinks.

Lab-Made
Shades can vary from stone to stone. Gemesis makes mostly yellows and oranges; Chatham, pinks, blues and yellows. Prices range from about $2,000 to $7,000 a carat.

Cubic Zirconia
These stones come in a variety of colors, including pink, orange, blue, green and yellow. Prices generally run $10 to $25 for a stone the size of a one-carat diamond.

CURRENT STYLES

STACKING RINGS ▶
Apollo, $800 to $1,600, set of four
A mix of lab-grown colorless and colored diamonds. www.apollodiamond.com

FANCY ▶ INTENSE BLUE DIAMOND RING
Barneys New York, $1.3 million
Part of designer Sharon Khazzam's rare natural diamond collection, shown by appointment at the store.

JOURNEY PENDANT ▶
Blue Nile, $1,350
A series of diamonds, arranged by size and said to symbolize love's journey, is a popular style.

BABYLON TALISMAN MEDALLION ▶
De Beers, $20,000
Incorporates rough diamonds as part of the company's push to highlight natural stones.

◀ PINTURA EARRINGS
About $8,500
Gemesis lab-grown stones are mixed with small natural diamonds in this collection. Check www.pinturadiamonds.com for retailers.

Stones (1-r): GIA (2, natural); Apollo; Chatham; Sigvaly (2, CZ)