



A New Day for DIAMONDS

Lab-created gems are shaking up the jewelry market.

by GARY DAUGHTERS

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To re-phrase a well-known marketing message, diamonds take forever. Formed under extreme pressure and high temperatures deep inside the Earth and delivered toward the surface by volcanic eruptions, conventional diamonds are typically more than a billion years old.

Now, machines can do the job in under three weeks.

They are not “fake,” either. Synthetic diamonds grown in laboratories have the same chemical properties as natural diamonds. Long employed for heavy, industrialized purposes and more recently used in goods such as flat screens, medical equipment and solar panels, lab-grown diamonds are set to disrupt the jewelry market by offering a nearly boundless supply of stones at prices a fraction of what natural diamonds cost.

“The interest in this has just exploded over the past few years,” says Paul Ziminsky, an independent diamond analyst and consultant based in New York.

Perhaps the surest sign yet that lab-grown diamond jewelry is catching on is a 60,000-sq.-ft. (5,600-sq.-m.) synthetic diamond factory soon

to open in the Portland suburb of Gresham, Oregon. What pops out is the name: De Beers. The world’s largest producer of diamond jewelry, De Beers had long resisted entry into synthetics, fearful of cutting into its own brand. But times have changed, and so has the market.

“We see an opportunity that’s been missed,” says De Beers Chief Executive Bruce Cleaver. “Affordable fashion jewelry may not be forever, but it’s perfect for right now.”

Only in the last five years have synthetic diamond producers begun to create stones of sufficient aesthetic appeal to compete with natural diamonds. With jewel makers having adopted technology developed by the solar industry, the quality of lab-grown diamonds has progressed to the point where even gemologists, using the naked eye, can’t always distinguish what’s synthetic from what’s natural.

Lab-created diamond production for use in jewelry, says Ziminsky, now exceeds 1.5 million carats annually. He predicts that the synthetic diamond jewelry market, now an estimated \$1.9 billion, will grow at 22% annually to \$5.2 billion by 2023 and to \$14.9 billion by 2035.

Emerging diamond technology produces in weeks what nature needs eons to do.
Source: Lightbox

Presently, there are two popular methods of growing synthetic diamonds. High Pressure, High Temperature (HPHT) is a process used for decades to manufacture diamonds for industrial use, which still account for 90% of the worldwide synthetic market. Used primarily in China, HPHT simulates the brutal force of subterranean Earth by applying searingly high temperatures and high pressure to dissolve carbon into a diamond seed.

More recently, synthetic diamond makers have adopted a newer process called Chemical Vapor Distribution (CVD). Akin to 3D printing, CVD layers carbon on the diamond seed in a vacuum chamber. Increasingly favored for use in the jewelry market, CVD is easier to control and monitor than HPHT. It also requires less heat (1,500 degrees Fahrenheit) than HPHT, which employs temperatures comparable to the outer layer of the sun.

What's interesting about the CVD method, Ziminisky says, is that it was largely developed by the solar industry, which invested heavily in it to produce polysilicon for solar panels.

The LED light bulb industry also spent a lot of money advancing that technology for light bulb production.

which is expected to reach its full output potential of 100,000 carats a year in 2020. Element Six Technologies, an Oxford, England-based synthetic diamond technology company owned by De Beers, is to manufacture gems at the plant exclusively for De Beers' new fashion-jewelry brand, Lightbox.

The synthetic gems will sell for \$1,000 for a quarter-carat stone and \$10,000 for a one-carat version, says Element Six. Natural diamonds, by contrast, generally cost more than \$50,000 per carat.

Oddly enough, De Beers has dismissed the distinctiveness of its own new products. The company said it would not grade its lab-grown diamonds because "we don't think they deserve to be graded." Industry analysts say such sentiments reflect the company's wider interest in protecting the natural diamond market, where it dominates. Last year, De Beers generated more than \$1 billion in revenue for its parent company, Anglo American.

De Beers, says Ziminisky, has long been one of the front-runners with synthetic technology, but they never really used it to make diamonds for jewelry because they didn't want to directly compete with the natural diamond industry.



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— Paul Ziminisky, Independent Diamond Analyst

Ziminisky says that as CVD technology improves, industrial uses for lab-grown diamonds are likely to grow more exotic.

The new frontier, he says, is going to be producing very high-quality diamonds that can be used for laser equipment, processing chips, quantum-computing components and nuclear batteries. We're not there yet because companies can't produce those higher quality diamonds at a low enough price for high-tech industrial uses, but that's CVD's longer-term goal. So, it's an industry that can eventually be worth in the hundreds of billions of dollars.

De Beers says it will invest \$1 billion over four years to develop the Portland-area facility,

But I think the development of some of the other companies has progressed enough where they wanted to get in the game and use their marketing and distribution power to try to steer the public perception of what man-made diamonds are. They don't necessarily see this as a significant revenue contributor for the company. Maybe at some point they will, but I think this is more of a strategic marketing position play at this point.

De Beers says its manufacturing process is extremely energy intensive, which made the relatively low electricity costs typical of the Upper Northwest a major factor in choosing the Portland area for the new factory.