UofL's Conn Center partners with local company to mine diamonds above ground

By **Andrew Marsh** - JANUARY 14, 2020

Diamonds, photo courtesy of Pixabay.

A technological marvel is happening in Kentucky – growing diamonds above ground using reactors that mimic what happens in Mother Nature over a million years, but in a much more controlled environment. The company, Kentucky Advanced Materials Manufacturing (KAMM), recently implemented a pilot plant/demonstration facility in Louisville in collaboration with UofL's Conn Center for Renewable Energy Research.

This initial facility is meant to serve as the foundation of a billion-dollar worldwide effort to grow large diamond stones for a myriad of applications, including gems. KAMM is the first to establish such capabilities in the Commonwealth of Kentucky and one of only a handful of global players in this highly advanced field.

UofL's Conn Center has conducted research on lab grown diamonds since 1997 and has a large interest in advanced materials, like diamond, for both power devices and biosensors. KAMM's founder, Vikram M. Shah, sought out the Conn Center to be a U.S. partner in a pilot plant/demonstration facility. KAMM's current facility is already producing around 1,000 carats of diamond per month.

A long-term home for the large production facilities is still to be determined.

"We are exploring the USA to see where we can settle," Shah said. "Our priority is Kentucky because of our great relationship with the Conn Center, but we are looking at various options."

KAMM is a subsidiary of Da Vinci holdings, a global organization with existing operations spanning the entire diamond industry from jewelry manufacturing (cutting/polishing) to trading and distribution. In addition to KAMM, Da Vinci has also operated a diamond growing operation in India for the past decade and is currently establishing a similar operation in Limburg, Belgium. Shah is also founder and owner of Da Vinci holdings.

Diamonds are most commonly known for their beauty and brilliance with the jewelry industry serving as their largest market. Currently, most diamonds are extracted from mines around the world and sent for cutting and polishing in India and Israel. KAMM is producing the highest purity (category IIa or better) diamonds, which are prized for both gem applications (for their clarity and brilliance) as well as industrial applications (for their superior hardness, thermal conductivity, and electrical/optical properties). Only 2% of mined diamonds fall into the IIa category. KAMM's Kentucky plant will produce diamonds which will then be cut, polished, and distributed in a similar manner to mined diamonds.

"Diamond is an advanced material with superlative properties making it the best choice for many technological applications, including those that enable connection of renewables to the grid," explains Dr. Mahendra Sunkara, professor of Chemical Engineering and director of the Conn Center. "The availability of diamond wafers can make innovation possible with next generation renewable energy and biosensors."

UofL President Neeli Bendapudi said attracting high tech research and manufacturing companies is critical to the success of the university.

“As the university enhances the business ecosystem through innovative research-based engagements, like this one, we also lay a foundation for increased economic impact. This partnership will drive more and more companies and startups to look to UofL and Louisville as the global intellectual capital of high-tech manufacturing,” she said.

Per a report from Bain & Co., the current capacity of lab-grown diamonds for the gem market alone is estimated at 2 million carats per annum. By 2030, the market could increase to 10 million and 17 million carats per annum with a growth rate of 15 to 20 percent. Currently, about 150 million carats gems-grade natural diamonds are mined annually. Industrial applications for large single crystal diamond can be in the range of several billion dollars per year for power devices and sensors.

Andrew Marsh

https://www.conncenter.org/andrew-marsh

Andrew Marsh is the Assistant Director of the Conn Center for Renewable Energy Research, where he is responsible for daily operations, public relations and communications, and facilitating the growth of the center. He is the Program Officer for the UofL Leigh Ann Conn Prize for Renewable Energy, which recognizes outstanding renewable energy innovations with demonstrated commercial impact. Marsh is a metal and wood sculptor through his Lucky 7 Arts, LLC, chairs the board of directors for Josephine Sculpture Park, and was an artist in residence at City Museum.