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San Marcos tech company bets big on tiny quantum dots Resize text A | A | A

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BY [KIRK LADENDORF](#) - AMERICAN-STATESMAN STAFF

If you are geeky enough, you can appreciate why quantum dots are fascinating to materials scientists and entrepreneurs – and to big television companies like Japan’s Sony Corp.

The dots are tiny, tiny crystals – discovered in a chemistry lab in the early 1980s – that give off precise colors of light when they are excited by an energy source. And a company that has the right chemistry know-how can alter the colors of the light emitted by changing the size of the crystals it produces.



Stephen Squires is CEO of San Marcos-based Quantum Materials Corp. Photo by Quantum Materials Corp.

Naturally, quantum dots have attracted a number of small companies that have found ways of producing dots for commercial use. Some medical device makers use small quantities of dots as substitutes for dyes so that doctors and researchers can better distinguish the difference between healthy and diseased tissue in the body. Such dots are very expensive, costing between \$3,000 and \$10,000 a gram, according to experts in the field.

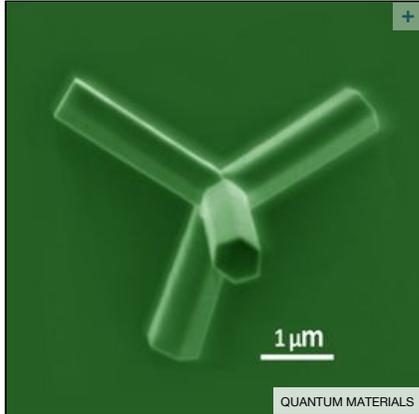
Sony Corp. became the first big manufacturer to introduce a high-end line of flat-panel TVs that use the dots to deliver more precise colors. Sony introduced the high-end TVs under its Triluminos brand early this year and analysts raved about the spectacular colors they delivered. The new Sony models are considerably more expensive than conventional flat-panel television sets. Other display makers including South Korea’s Samsung Electronics Co. and LG Corp. are also reported to be studying ways to incorporate the dots into advanced TVs.

So all of that activity explains why Stephen Squires, CEO of San

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Marcos-based Quantum Materials Corp., is excited about the long-term prospects for his small company that presently has just a dozen employees.



A microscopic image provided by Quantum Materials Corp. shows a tetrapod, a type of quantum dot that has potential to be ... [Read More](#)

The San Marcos company produces a different kind of dot – called a tetrapod – that Squires says has the potential to be better, cheaper and easier to work with than conventional dots. The big difference is shape. Conventional dots are tiny spheres that Squires describes as tiny bowling balls. But the tetrapod dot has a spherical core with four arms that stick out like spikes.

The shape and the structure of the tetrapod, Squires believes, makes it a better candidate for commercialization than conventional dots, which tend to clump together when they are manufactured, which harms their light-

emitting properties. With the arms sticking out, tetrapod dots disperse more easily. And the new dots can be engineered so that they emit two colors of light at the same time – one color from the core and a second from the arms. Potentially that means TV makers and other customers could use fewer dots to accomplish the same task.

In addition to shape, Squires' company has the exclusive license to make its dots in a process discovered by Rice University researcher Michael Wong. Quantum Materials has spent six years perfecting the process and getting it ready to be used for high-volume manufacturing.

This year, the company has supplied sample quantities of its dots to three unnamed potential customers – an Asian display manufacturer, an LED light maker and a maker of advanced medical devices. And two of those customers are showing signs of strong interest – they have ordered new samples of slightly tweaked tetrapod dots that are closer to their development needs, Squires said.

While those early potential customers study those samples, Quantum Materials is ordering the equipment it needs to ramp up higher volume manufacturing in the first half of next year. The company is based in the Star Park incubation center for technology companies that is affiliated with Texas State University. It also is collaborating with Texas State researcher Tania Betancourt.

Quantum Materials has raised \$3 million so far and it expects to raise more in the coming year from a small group of investors, that includes Squires.

If things go well and its potential customers commit to significant orders, the company could shift from being a small research and development company to a somewhat larger chemical manufacturing

operation. It will do its own manufacturing to protect its intellectual property, Squires said.

Texas State chemistry professor Gary Beall, a veteran of several nanomaterials startups, rates Quantum Materials as a promising company that has moved beyond the bootstrapping stage. Part of the struggle for young companies in the field is finding the right potential customers and convincing those customers that newer materials can lower costs or produce better products.

But Squires said his company hasn't had to engage in prolonged customer education yet, because manufacturers are approaching it. They have already studied the potential of quantum dots and wanting to investigate whether tetrapod dots are superior and more economical.

"The quantum dot has been widely studied," said company research vice president David Doderer. "The hindrance to acceptance has been cost and the ability to scale (production)."

The education Quantum Materials has to do, Squires said, is prove that its dots are better and can be made more efficiently than competing dot makers.

"We are educating display makers on why the tetrapod dot is way better," he said. "The company's progress is very encouraging to see. We can see the finish line, but we are not there yet."

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