LEDs

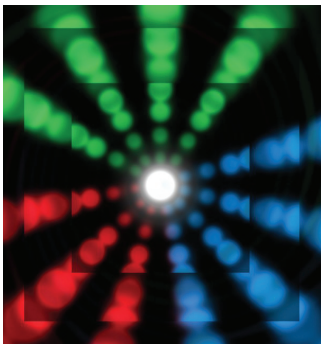
Industry experts, government officials, and independent consultants all agree that solid state lighting, or SSL, will revolutionize the lighting market through the introduction of energy efficient, long lasting, and more versatile light sources. Already, niche markets such as traffic signals and signal-lighting in automobiles have been penetrated by SSL; however, the ultimate prize for SSL is to overtake incandescent and fluorescent lights in the general illumination market. SSL is the area in which Victor Klimov, a prolific researcher at Los Alamos National Laboratory, and his team are hoping to use their invention to break into industries such as traffic signals, general illumination and others.

In 2004, Los Alamos scientists Klimov, leader of the Softmatter Nanotechnology team, and Milan Sykora, the team's business liaison, asked the Technology Transfer Division's MBA interns to investigate the market for one of the team's inventions, Quantum Dot-based Light Emitting Diodes, or LED, by Förster Energy Transfer (also called fluorescence resonance energy transfer used to study macromolecules). Quantum dots are semiconductor nanocrystals used in such applications as solid state lighting, electronics and lasers. Klimov and his team worked with quantum dots for more than ten years and were interested in exploring the commercial potential of their invention.

MBA intern Garett Vail, from the Tuck School of Business at Dartmouth University, led a team of interns to research and analyze the market for the quantum dot LEDs designed by Klimov. Vail's team researched the market size, growth and potential current applications for the quantum dots. The team also delivered recommendations based on its findings from this research.

"What we ended up delivering was a comprehensive market study from a feasibility point of view," Vail said. "Victor and his team were interested in finding out if this was the type of endeavor that could be spun out as a start-up company or if licensing was a better commercialization option. We determined that [starting a spinout company] would be very capital intensive and that a licensing agreement with an industry partner was preferable to starting their own company based on the quantum dots for LEDs."

Vail also said that his team did a lot of secondary market research pulling together research materials on quantum dots, LEDs and



Multi-colored light emitting diode (LED)

each market in which Klimov's technology may have had an application. By analyzing the LED market and constructing a technology roadmap, it was determined that the LED research team at Los Alamos should move forward with creating a prototype and looking into other funding opportunities to further develop the technology.

"Working with the MBA interns was a positive experience from our perspective because the scientists working on our team often do not have the time or the experience to explore the commercial aspects of the technologies developed in our laboratory," Sykora said. "It was great to have three or four extra pairs of hands with business experience to help us with researching the market and competitive environment and identifying the best path forward towards commercialization of the quantum dot-based LEDs."

> *"What we ended up delivering was a comprehensive market study from a feasibility point of view, . . ."*

Garrett Vail, 2004 MBA intern from the Tuck School of Business at Dartmouth University