

Tiny quantum dots hold promise for future source of lighting

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(PhysOrg.com) -- UT Dallas researchers are making strides in understanding the workings of quantum dots – nanosized particles that have immense potential in several industry applications.

Quantum dots could be used in a variety of ways ranging from illuminating the human body in high-tech medical imaging to increasing the efficiency of energy sources.

These tiny, semiconducting [nanoparticles](#) have a dark side though—they blink unpredictably. The effect is similar to switching a [light](#) on and off, substantially diminishing the effectiveness of light emission.

“Quantum dots are regarded as the next generation of efficient light sources because of their efficiency in both emitting and absorbing light,” said Dr. Anton Malko, assistant professor at UT Dallas. “Keeping them from blinking is key to facilitating their widespread use.”

The findings are detailed in a recent issue of the journal [Nano Letters](#).

Malko and fellow researchers from Los Alamos National Laboratory reported that by increasing the size of the exterior shell of the particles, blinking could be suppressed.

Researchers altered these quantum particles, which are mere billionths of a meter in size, by increasing them from around 4 nanometers to 15 nanometers.

“We observed that the same process that causes the dots to blink didn’t have the same effect when we scaled up the size,” Malko said. “We found that this process, the so-called “Auger” recombination, is strongly dependent on the thickness of the quantum dot’s shell and allows complete blinking suppression for large shell particles.

“Gaining a better understanding of all of the forces at work in this phenomenon will lead, hopefully, to a way of reducing these unpredictable behaviors in quantum dots,” Malko said. Making [quantum dots](#) with uninterrupted light output will certainly help in their employment in a variety of applications ranging from biomedical imaging to quantum information processing.

Provided by University of Texas at Dallas

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