

ADVANCING AMERICA *through* TECHNOLOGY TRANSFER

# LAWRENCE BERKELEY NATIONAL LABORATORY

TRANSFORMING *the* ELECTRONIC DISPLAY INDUSTRY



QUANTUM DOTS

**CAPTIVATING USER EXPERIENCES  
WITH MORE VIVID *and*  
EFFICIENT DISPLAYS**



BERKELEY LAB

U.S. DEPARTMENT OF

**ENERGY**

Office of  
TECHNOLOGY TRANSITIONS



# BERKELEY LAB

## How do we improve display performance, power consumption, and cost?

Scientists at Lawrence Berkeley National Laboratory (LBNL) discovered how to manipulate a type of nanocrystal, called a quantum dot, to emit pure colors at nearly perfect photo conversion efficiency. Startup licensing of these color-tunable nanocrystals and an industry partnership yielded a nanoscience breakthrough for electronic display technology with the development of engineered sheets of quantum dots. Commercialization of engineered quantum dot sheets has resulted in brighter, more color-accurate, and less power-consumptive displays when compared to larger particle Liquid Crystal Display (LCD) peers within the same price point.

### LBNL at a Glance

Located in the hills above University of California (UC) Berkeley and overlooking the San Francisco Bay, Berkeley Lab was founded in 1931 on the belief that the biggest scientific challenges are best addressed by multidisciplinary teams. Berkeley Lab continues this legacy by connecting diverse teams of researchers to develop sustainable energy and environmental solutions, create useful new materials, advance the frontiers of computing, and probe the mysteries of life, matter, and the Universe. In addition, scientists from around the world rely on the Lab's facilities for their own discovery science.

### U.S. Department of Energy Laboratories

The 17 U.S. Department of Energy (DOE) National Laboratories comprise a preeminent federal research system that executes long-term government scientific and technological missions, often with complex security, safety, project management, or other operational challenges. The National Laboratory system produces the scientific research needed to develop national energy policy and solutions allowing DOE to be one of the largest supporters of technology transfer in the federal government.

**Quantum dots provide cost competitive and energy efficient displays with uncompromised color accuracy and brightness**

#### Discovery

LBNL's quantum dots are only 50 atoms wide and made from a cadmium-selenide core within a cadmium-sulfide shell.

#### Technology

Engineered quantum dot sheets provide 50% wider color spectrum and 20% lower power consumption over LCD.

#### Industry

Licensed quantum dots technology is used in HDTVs, tablets, laptops, and smartphones.

### Contact Us

The scientific discovery highlighted on this poster is just one of DOE's many successes advancing America.

Learn more about available resources and partnering opportunities with the National Labs by visiting:

[www.energy.gov/technologytransitions](http://www.energy.gov/technologytransitions)

### Technology Transitions

The mission of the Office of Technology Transitions (OTT) is to expand the commercial impact of the DOE's research and development portfolio to advance the economic, energy, and national security interests of the Nation. The office develops the Department's policy and vision for expanding the commercial impact of its research investments, and streamlines information and access to DOE's National Labs and sites to foster partnerships that will move innovations from the labs into the marketplace.

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