

7th IIC-EMTCCM

European Master in Theoretical
Chemistry and Computational
Modelling

7th International Intensive Course



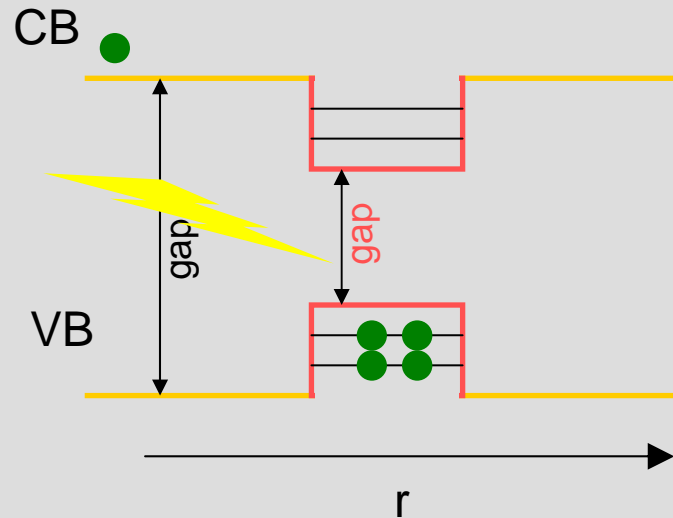
SOLID STATE AND MAGNETISM

Quantum Dots: Periodicity and Confinement

J. Planelles



So, what is a quantum dot?



- Discrete energy levels: “Artificial Atoms”
- Control over the number and type of carriers
- Flexible design of energy spectrum



What is a quantum dot good for?

nature

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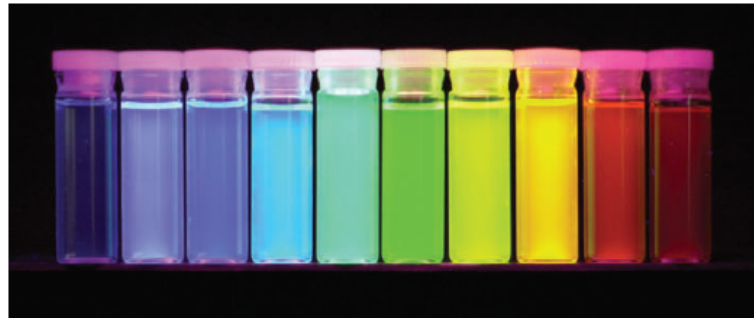
SPECIAL REPORT

Quantum dots go large

A small industry could be on the verge of a boom, reports **Katharine Sanderson**.

Nanocrystals called quantum dots have promised to revolutionize display technologies, solar power and biological imaging for more than a decade. Yet the quantum-dot market has remained small, with a handful of companies selling dots directly to researchers, using the particles to develop their own products or licensing their technologies to partners.

"Quantum dots have been around for quite a while, but they're taking a really long time to mature," says David Hwang of the market-analysis company Lux Research in New York. A key barrier is price: quantum dots can cost anywhere from US\$3,000 to \$10,000 per gram, restricting their use to highly specialized



There's gold at the end of this rainbow.

X.GAO

Quantum dot memory may be 'Holy Grail' of compu...

<http://www.newscientist.com/article/dn13426-qua...>

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Quantum dot memory may be 'Holy Grail' of computing

17:14 07 March 2008 by **Mason Inman**

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What is a quantum dot good for?

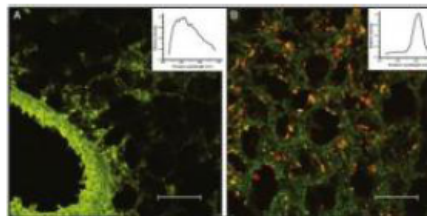


Samsung and Evident Technologies Enter Into LED Patent Agreement

TROY, N.Y. and SEOUL, South Korea, May 5, 2011 /PRNewswire/ -- Evident Technologies, Inc. and Samsung Electronics Co., Ltd have entered into a comprehensive patent licensing and purchasing agreement for Evident's **quantum dot LED technology**. This agreement grants Samsung worldwide access to Evident's patent portfolio for all products related to quantum dot LEDs from manufacture of the quantum dot nanomaterials to final LED production.

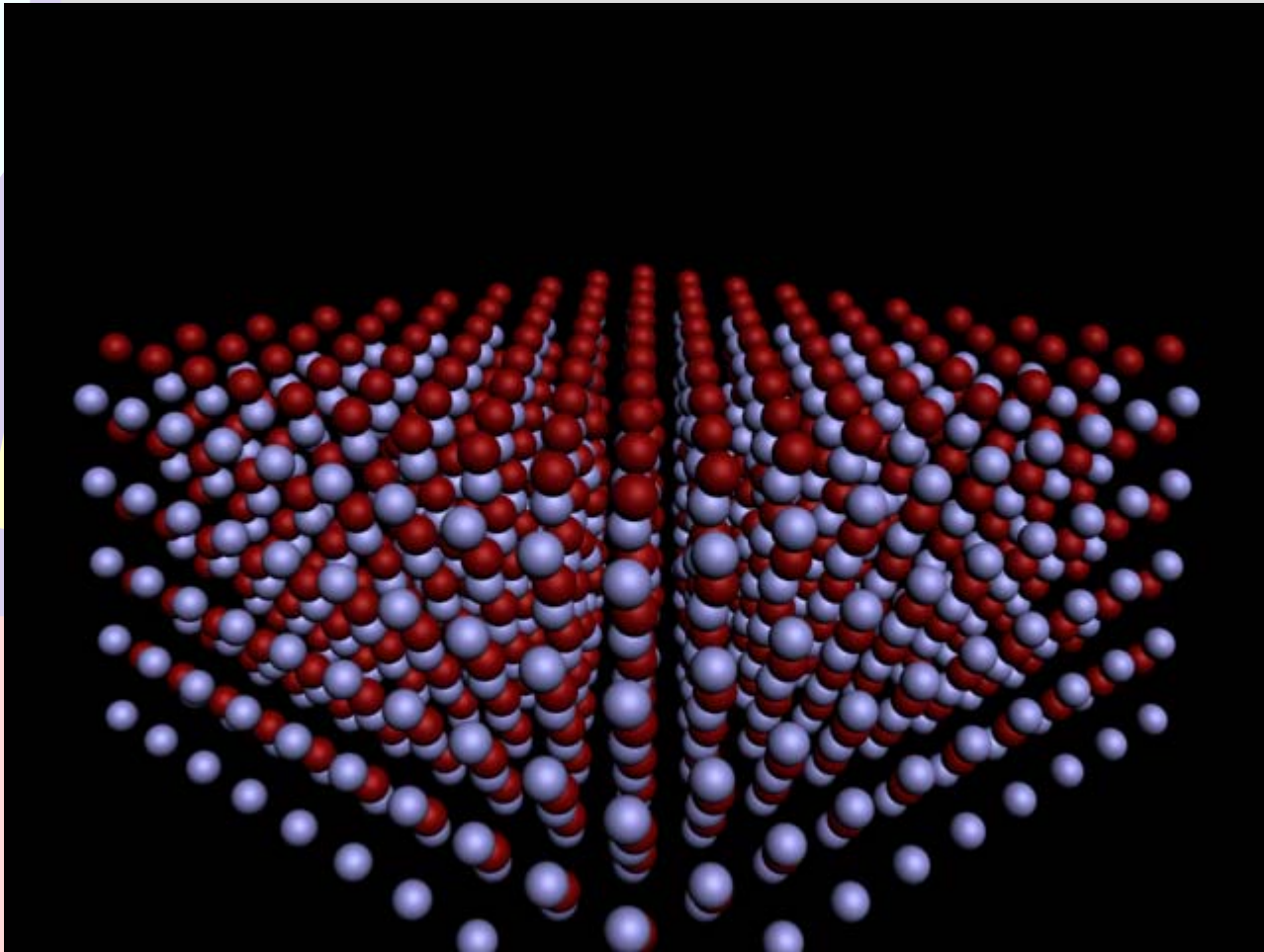


Cancer drug linked to quantum dots increases drug uptake, reduces inflammation

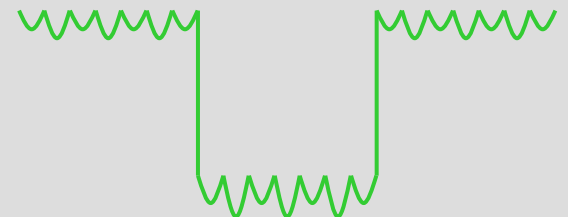


The left image shows lung tissue injected with doxorubicin alone, while the image on the right (yellow dots) indicates the increased uptake of the quantum-dot delivered drug. Credit: University at Buffalo

A closer view

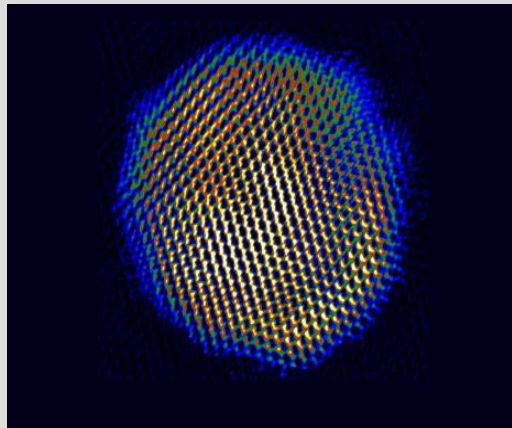


QDs are periodic inside



Today, in this course...

Lecture 1. Periodicity and Spatial Confinement



Lecture 2. Magnetic confinement

