Quantum-dot LED screens may soon rival OLEDs and LCDs

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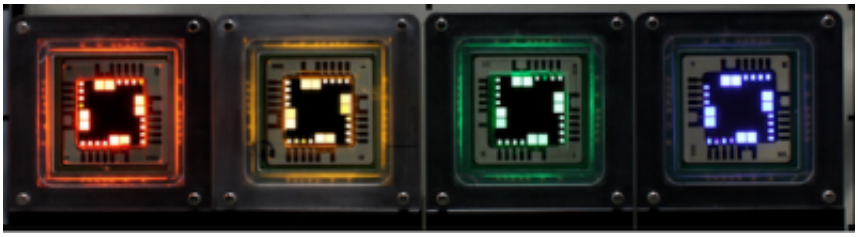

Quantum Dot LEDs (QLEDs). Image: QD Vision

(PhysOrg.com) -- A partnership has been formed between US, South Korean and Belgian companies to develop quantum-dot light emitting diode (QLED) displays to rival the organic light emitting diode (OLED) markets and eventually also LCD applications such as computer screens and televisions.

Massachusetts company QD Vision, a spin-off from the Massachusetts Institute of Technology, has joined with LG Display, headquartered at Seoul, and Solvay, a chemical company based in Belgium, to develop and manufacture active matrix QLED displays.

The technology uses nano-scale semiconducting crystals that shine when exposed to electrical current (electroluminescence) or light (such as that produced by LEDs), producing a bright light and pure colors. QD Vision is working on electroluminescence, which is the best option for creating

a display in which quantum dots are the main element.

Chief Technology Officer with QD Vision, Seth Coe-Sullivan, said the project is approaching the point at which it can be commercialized as a rival to the OLED displays. Coe-Sullivan said the OLEDs have some unresolved challenges, especially for applications needing larger displays, and he sees QLEDs as the way to solve them.

OLEDs are created using a “shadow mask” that allows them to be patterned as they are deposited, but this technique is only accurate for small displays. Since QLEDs are manufactured without the need for a shadow mask, the problem of reduced accuracy does not arise. The quantum dots can be suspended in a liquid and deposited using a range of techniques, even including ink-jet printing, onto extremely thin, flexible, or transparent substrates.

Coe-Sullivan said another disadvantage of OLEDs is that some need color filters to enable them to produce pure colors, but QLEDs produce pure, rich colors from the start. He said QLEDs are "fundamentally superior" to OLEDs in the way they convert electrons to photons, and this means much greater energy efficiency. They are also cheaper to make.

One of the challenges for the QLED developers is that currently the best QLEDs have a lifetime of only 10,000 hours, which is not enough for a large display. Another is making sure the color reproduction is uniform throughout the spectrum. Coe-Sullivan said the company has made a great deal of progress and commercialization should soon be possible, but he declined to give a precise timeline.

QD Vision is not the only company developing electroluminescent quantum dot displays, as Nanosys, a company based in Silicon Valley, is working on a product that includes a strip of quantum dots on a liquid

crystal display backlight to improve the energy efficiency and color quality.

More information: www.qdvision.com/qled-technology