

Cd-free Quantum Dot Materials for Displays

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Ever since the quantum dot (QD) was discovered, many applications adopting QDs have been proposed and a lot of investigations have been carried out for more than 30 years.

Especially, the wide color gamut display with QDs as active light emitting materials have drawn much attention from the academia as well as the industry. And, the QD-enabled consumer displays including large size TVs, portable tablets, and special monitors are now on the market. They provide best color gamut, reasonable power efficiency, and affordable price showing superior competitive edge to OLED technology.

However, up to this point, the implemented QDs in the practical devices contain Cadmium element in their compositions. Although the Cd-containing QD-LEDs has been given exemption from the European RoHS Compliance Applications until July 2016, there has been continuous concerns about producing large quantity of Cd-containing materials and using them in the consumer electronics. And, this growing apprehension for environmental issues formed great limitation for QD's applications.

Therefore, we have been dedicated to develop more environmentally friendly materials such as InP-based QDs that showed considerably high efficiency and saturated color spectrum compared to the Cd-containing materials. The structure of Cd-free QD was specially designed and the synthetic process was optimized to produce reliable materials in commercial scales. In order to improve the stability of the Cd-free QDs in the devices operating under severe atmosphere, tailored composite materials were selected and their fabrication process was also optimized. In 2015, Samsung released the first Cd-free QD adopted UHD TV, which is called **SUHD**, with several product lines. The spectacular color, one of the best features of the **SUHD**, is realized by Cd-free QD materials. In the talk, the characteristics of the first commercial Cd-free product and the internally developed technologies in Samsung will be introduced.

