Advances in quantum dots for lasers and single photon sources

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Abstract

Since the first proposal of the concept of the quantum dot by Arakawa et al., in 1982, the quantum dots have been intensively investigated for both fundamental solid state physics and device applications. Advances of self-assembling crystal growth technology of quantum dots enabled realization of high performance semiconductor lasers and quantum information devices such as single photon sources. The quantum dots can also be applied to solar cells with a predicted conversion efficiency over 75%. Moreover, implementing a single quantum dot within an optical nanocavity provides a new platform for solid-state cavity quantum electronics (QED).

In this presentation, we discuss progress in quantum dot photonics such as quantum dot lasers and single photon sources. Recent advances in quantum dot cavity-QED are also reviewed.