Colloidal semiconductor quantum dots have attracted great attentions in recent decades due to their unique optical properties including high quantum yields, tunable optical properties, and narrow-band emission. The solution processibility of these nanomaterials also enables low-cost, high throughput processes for device manufacturing. Built upon the success in controlling the size, shape, and composition of quantum dots during colloidal synthesis, researchers have employed quantum dots as the light emitters to achieve efficient electroluminescence, for potential applications in flat-panel displays and solid-state lighting. In this talk, I will present some of my group’s work on improving the manufacturability and performance of quantum dot based light-emitting devices, as well as in terms of understanding the basic operation principles. Maximum external quantum efficiencies in the range of 12-15% have been now achieved for blue/violet, green and red emitting devices with long lifetimes ~100,000 hours or higher for the green and red devices. [L. Qian et al., Nat. Photon. 5, 543 (2011); H. Shen et al., Nano Lett. 15, 1211 (2015); Y. Yang et al., Nat. Photon. 9, 259 (2015).]

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