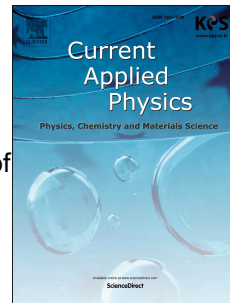


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# A Solution-Processable Inorganic Hole Injection Layer that Improves the Performance of Quantum-Dot Light-Emitting Diodes

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## Abstract

Solution-processable vanadium oxide ( $V_2O_5$ ) was used as an inorganic hole injection layer (HIL) to improve the performance and stability of quantum-dot light-emitting diodes (QLEDs). Non-acidic and non-hygroscopic  $V_2O_5$  solution was synthesized and spin-coated onto indium-tin-oxide (ITO)/glass substrate to serve as an HIL for QLEDs. QLEDs with a  $V_2O_5$  HIL showed efficient hole injection and had improved luminous efficiency and life-time. Maximum luminance and luminous efficiency of QLEDs fabricated under ambient conditions were 12,603  $cd/m^2$  and 2.96  $Cd/A$ , respectively. Photoelectron spectroscopy measurements were conducted to construct an energy level diagram of the QLEDs, and we found that the gap states of  $V_2O_5$  enabled efficient hole-injection from ITO into the devices through the  $V_2O_5$  HIL, resulting in enhanced luminance. These results suggest that solution-processable  $V_2O_5$  is a feasible alternative to organic HILs for high-performance QLEDs.

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