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Organic-inorganic hybrid materials for energy efficiency

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Quantum dot (QD) semiconductor nanocrystals are unique hybrid materials that have been considered in a broad range of energy production and energy efficiency applications including LEDs, displays, lighting and solar cells. In their photoluminescent mode of operation, QDs are currently in lighting products, and have the promise to be in liquid crystal display products in the near future, in both cases offering energy efficiency gains in the range of 25-40%. In electroluminescent mode, quantum dot light emitting devices (QLEDs) are an emerging class of thin-film hybrid organic-inorganic structures that can potentially achieve best-in-class performance amongst large-area emissive light sources. Indeed, efficiencies which double that of the most efficient OLEDs have been suggested. The hybrid nature of these materials offers the key design parameters that have enabled QD technology to reach market in lighting products, and promises to soon revolutionize the display industry.