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Thick is good

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A thickness dependence study of polymer based light-emitting diodes spanning from 31 nm to 3 um shows that devices with micron-thick films of semiconducting polymers (ten times thicker than the standard devices) had the best performance, which is exceptionally thick for PLEDs. The efficiency of 47cd/A is higher than the theoretical prediction according to spin statistics. Transient studies reveals that high current density introduced by the Ohmic hole injection of MoO_3 at anode promote triplet-triplet annihilation and results in delayed electroluminescence. Hence, singlet formation is no longer 25%, but actually approaching 40%. This research shows the power of interface engineering in making efficient single layer devices, which has been the Holy Grail for the organic electronics community. This is very important for industrialization of this technology - e.g. in lighting, where the reduced manufacturing tolerances make large area manufacturing far more practical. This work represents a literal step change in the previous requirement that PLEDs be very thin and proved to be the model system for the study of polymer based LEDs.

Biography

Li Ping Lu has completed her PhD at the Cavendish Laboratory, University of Cambridge, under Prof. Sir Richard Friend. Her PhD research focused on air-stable hybrid structure polymer light-emitting diodes (PLEDs) and contributed to a broad range of projects, most notably for the design and operation of high efficiency PLEDs. After her PhD, she moved to the field of 2D semiconductors and refined a solution in a processable approach to generate high quality 2D semiconductors for application in transparent and flexible atomic electronics. She is now focusing on exploiting advantages of 2D semiconductors in conjunction with organic semiconductors.

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