

Step-by-step toward eco-designed lighting devices

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In the last decades, four technologies have emerged as simple and low-cost solid-state lighting devices: polymeric light emitting diodes (PLEDs), light-emitting electrochemical cells (LECs), perovskite light emitting diodes (PeLED), and, recently, hybrid light-emitting diodes. While the former are purely electronic devices, LECs and PeLEDs show mixed ionic-electronic nature.¹ The rearrangement of mobile ions close to the electrode interfaces in response to an applied external bias leads to the formation of electrical double layers, facilitating efficient charge injection at low applied bias. Subsequently, the growth of p- and n-doped regions at the electrode frontiers is also controlled by the presence of ions, while the inner zone remains neutral (intrinsic region or i) as exciton formation and relaxation occur.¹ Thanks to their low fabrication cost and moderate performances, LECs are of high interest for soft-lighting applications and disposable (opto)electronics. Thus, the transition towards “greener” LECs is becoming urgent with respect to sustainable and/or biogenic emitters (nanographenes and copper(I) complexes),² dendrimer,³ and electrolytes⁴ towards rainbow highly performing LECs. Finally, a novel concept merging biological components in HLEDs has been heralded as a new approach towards sustainable light-emitting diodes without jeopardizing current device performance.⁵ All these aspects will be herein discussed.

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