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High efficient all-solution OLEDs and their transient electroluminescence

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Solution-processed OLEDs have always been the hot topic in the research of OLEDs. The electron-hole evolution in all solution processed OLEDs involves the carrier transportation, the exciton recombination and dissociation.The dynamic of excitons plays a crucial role in governing the ultimate device performance. Therefore, the fundamental understanding of the evolution of excitons is essential to achieve high emission performance with simple structured OLEDs. A series of devices, polymer light-emitting diodes (PLEDs), thermally activated delayed fluorescent devices (TADF) and phosphorescent devices (PhOLEDs), were prepared by solution method. We systemically investigated the dynamics of excitons by using transient photoluminescence measurements combining with transient electroluminescence measurements on the prepared different OLEDs. The dynamic properties of excitons upon both photo-excitation and electro-excitation offer in-depth insight to the fundamental mechanisms driving its decay pathways, and by studying the electric-field dependent motion, we can explore their emission evolution and the underlying reason for the efficiency roll-off of OLEDs.