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Band alignment in organic light emitting diodes – on the track of thickness dependent onset voltage shifts

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Organic light emitting diodes play an important role in our daily life, e.g. as displays in smart phones. Nevertheless these modern multilayer devices often show unexpected effects during operation. One of these phenomena - the thickness dependent onset voltage shift - is topic of this contribution. The investigations concentrate on two OLEDs that only differ in the emission layer but show an entirely different current-voltage behaviour. If the emission layer consists of the triplet host TH-A a shift in onset voltage in case of emission layer thickness variation can be observed. Using TH-B in the emission layer, an isomer to TH-A, the onset voltage remains unchanged. In a previous publication, we could show that an electric interface field is responsible for the thickness dependent onset voltage shift. The interface field is already present in the currentless case. This presentation now deals with the origin of such an interface field. Therefore the energetic alignment at the internal interfaces in the two different devices is measured by performing *in-situ* step by step interface experiments using photoelectron spectroscopy. In case of the device showing no onset voltage shift a flat band situation is measured, while in case of the other device (where there is the onset voltage shift) the formation of space charge regions is detected. A further stack modification proofs that the band bending at the hole injecting interface into the emission layer is responsible for the onset voltage shift.

Biography

Maybritt Kuehn has studied Material Science at the Technische Universitaet Darmstadt, Germany. With her diploma thesis she started to work in Jaegermann's group, completed her PhD there and continued with Post-doctoral studies. She did her PhD thesis in cooperation with the Merck KGaA, Darmstadt, Germany, at Innovationlab Heidelberg, Germany and focused on pholelectron spectroscopy. In her PhD thesis, she investigated the influence of energetic alignment at organic/organic-interfaces on the current-voltage behaviour of OLEDs.

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