Supplemental Document

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Improving the performance of OLEDs by controlling the molecular orientation in charge carrier transport layers: supplement

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S1. *Variable angle spectroscopic ellipsometry (VASE) analysis of TAPC films*

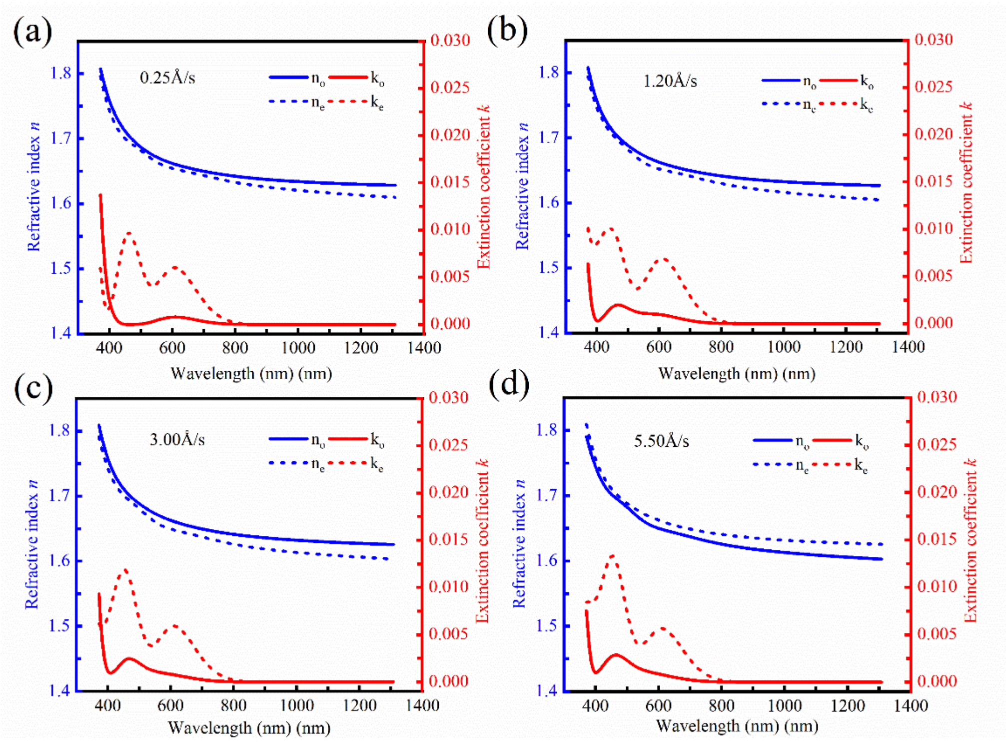

Fig. S1: Refractive index n and Extinction coefficient k of TAPC films based on various deposition rate.

S2. *Impedance spectroscopy analysis of the EODs*

In order to verify the weak resistance of preferentially vertical molecular orientation to charge carrier transport, the impedance spectroscopy of EODs was measured and the Nyquist plots as shown in Fig. S2(a). Z' and Z'' represent real and imaginary part of the impedance, respectively. In theory, the semicircular Nyquist plots can be modeled as resistance R_p and capacitance C_p in parallel and with a series resistance R_s [Fig. S2(b)]. The real and imaginary part of the impedance, Z' and Z'', related to the resistance R_p and R_s, which can be expressed by following equation (1):

$$\left[Z'-\left(R_s+\frac{R_p}{2}\right)\right]^2+(Z'')^2=\left(\frac{R_p}{2}\right)^2 \tag{1}$$

It is obvious that the circle center of the semicircular Nyquist plots at $(R_s+\frac{R_p}{2}, 0)$ and the radius is $\frac{R_p}{2}$ [1,2]. In the Fig. S2(a), the abscissa and radius of Nyquist plots decreased with increased deposition rate, which indicates that the resistance in the EODs is decreasing with increasing ratio of vertically oriented molecules.

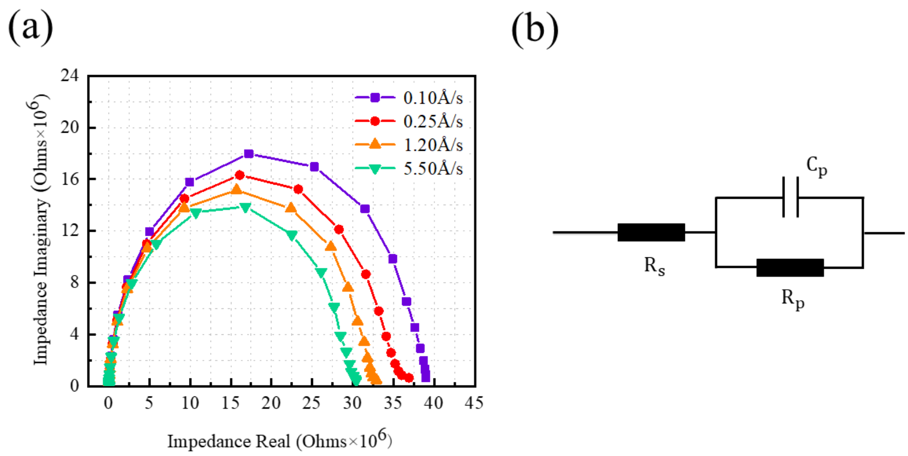

Fig. S2: (a) The Nyquist plots of EODs based on various deposition rate and (b) the equivalent circuit.

References

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