Electronic Supplementary Material (ESI) for Materials Chemistry Frontiers.

Supporting Information

Micro Organic Light-emitting Diodes Fabricated through Area-selective Growth

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Fig. S1 Molecular structures used in the work. Full name separately: NPB (*N,N'*-di(1-naphthyl)-*N,N'*-diphenyl-(1,1'-biphenyl)-4,4'-diamine); Alq_3 (tris-(8-hydroxyquinoline)aluminum); TPBI (1,3,5-tris-(N-phenylbenzimidizol-2-yl)benzene); DCM ((4-(dicyanomethylene)-2-methyl-6-(4-dimethylaminostyryl)-*4H*-pyran)).

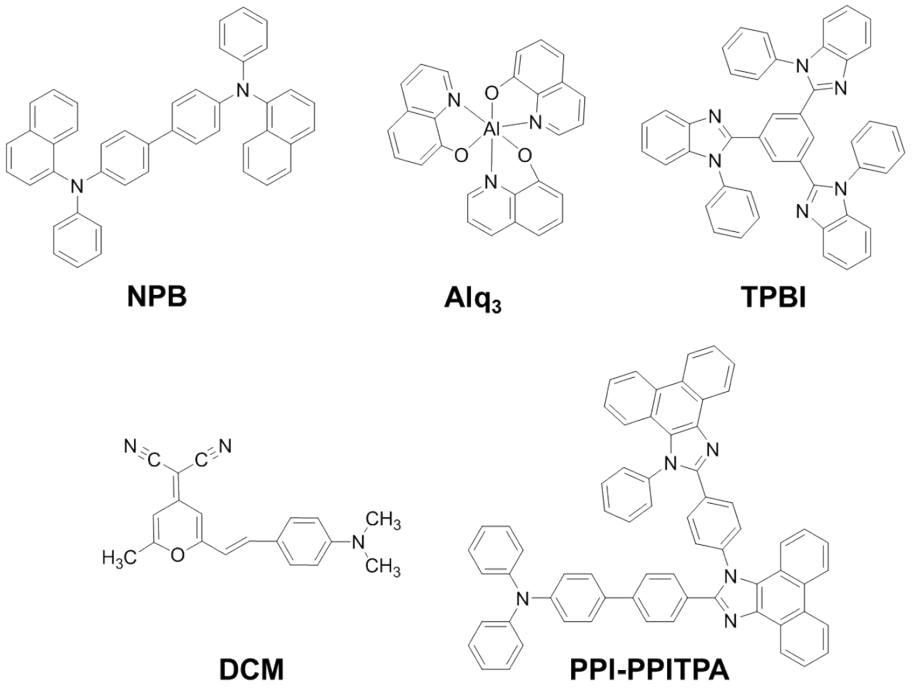


Fig. S2a shows the AFM height image and profile of the pre-patterns, in which the average height is about 6 nm and consist of 3 nm Cr and 3 nm Au. The pre-patterns consisted of an array of dots with diameters of 0.5 μm and spacings of 1 μm. Fig. S2b shows the AFM height image and profile of 8 nm NPB grown on the sample. The organic molecules were clearly seen to stay only on the Au dots and the morphology of NPB became dome-like.

Fig. S2 AFM height images of (a) Au patterns and (b) NPB selectively grown on Au dots. The height profiles corresponding to the above AFM images. The height of Cr and Au film is about 6 nm, and after NPB growth the height is about 50 nm. Au dots in the images are with a diameter of 0.5 μm and spacing in between of 1 μm. White scale bars in the images equal 5 μm.

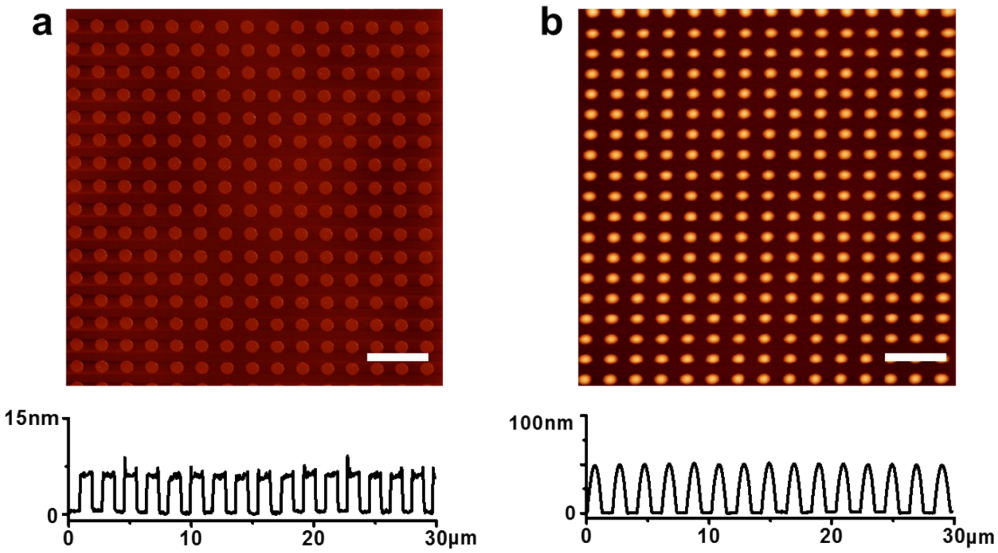


Table S1. The calculated areas are taken on the AFM images (Fig. 2 and Fig. S2). The volume of NPB on the Au pattern calculated by AFM software has a negligible error with the amount of NPB deposited on the whole substrate. It confirms that all the deposited NPB do completely diffuse to the Au pattern.

Diameter of Au Pattern	Amount of NPB deposited			Calculated by AFM software			Percentage error
	Deposition thickness	Calculated area	Volume (NPB)	Only Au pattern	after NPB growth	Volume (NPB)	
9 μm	8 nm	2500 μm^2	20 μm^3	4.72542 μm^3	25.303 μm^3	20.57758 μm^3	2.8%
0.5 μm	6 nm	900 μm^2	5.4 μm^3	0.405427 μm^3	5.75038 μm^3	5.344953 μm^3	1%

Fig. S3 The transmission spectra of 2 nm Cr on ITO glass (the black curve), and that after the annealing (the red curve).

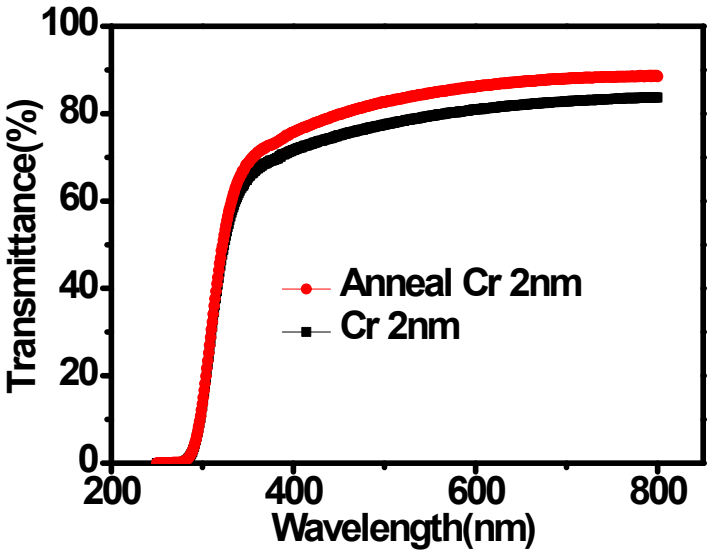


Fig. S4 The AFM height images of (a) Cr (2 nm) and Au (3 nm) on ITO glass, and (b) that after the annealing. (a) RMS (Root mean square) surface roughness = 0.8479. (b) Surface roughness = 0.7256.

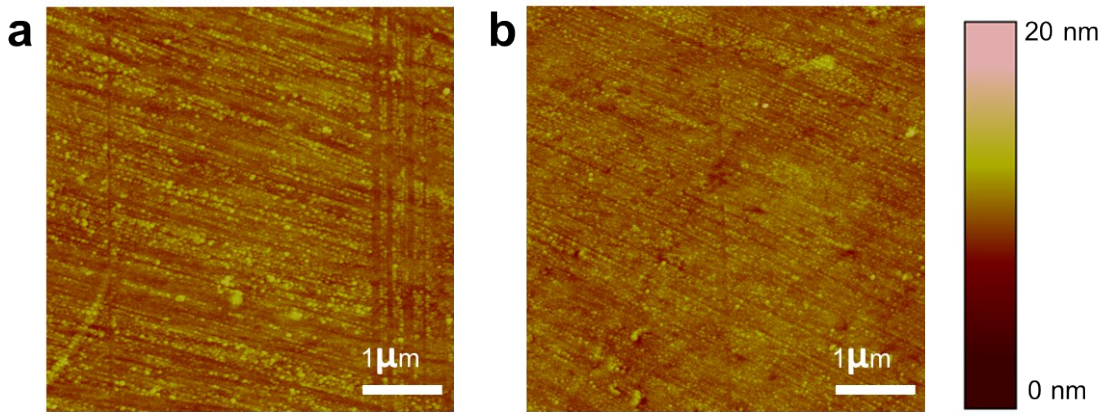
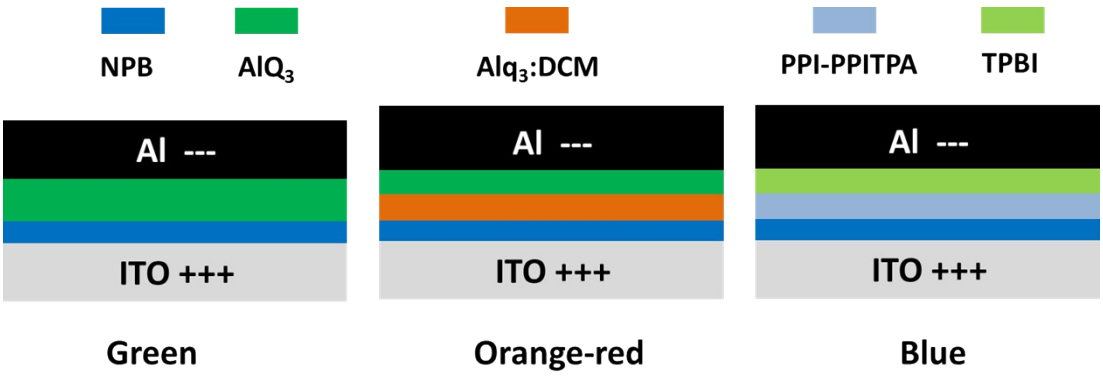


Fig. S5 The OLED device structures for green, orange-red and blue color emitting. (a) Structure diagram for three color emitting systems. (b) The detailed device structures including each layer thickness.

a

b



Emitting color	Device structure
Green	ITO/NPB(20nm)/Alq_3(70nm)/Al(120nm)
Orange-red	ITO/NPB(20nm)/Alq_3:DCM(35nm,2%)/Alq_3(35nm)/Al(120nm)
Blue	ITO/NBP(20nm)/PPI-PPITPA(30nm)/TPBI(50nm)/Al(120nm)