Electronic Supplementary Information (ESI) for the article entitled: Toward high performance broad spectral hybrid organic-inorganic photodiodes based on multiple component organic bulk heterojunctions

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✧ **Estimation of optimized weight ratio for multiple component organic bulk heterojunctions, leading to uniform and broadband photoabsorption**

We have optimized the weight ratio of different bulk heterojunction films. Compared to three-component devices the two-component devices with PTCDA:CuPc (weight ratio 1:1) don't have an uniform absorption spectra or photo responsivity which has been proved in the Fig. 2, Fig. 5a and Table 2. Especially, the two-component PTCDA:CuPc film has a low absorption in NIR region. Thus, we introduce NIR photosensitive material, PbPc, into PTCDA:CuPc film to form three-component film.

In order to achieve uniform and broadband photoabsorption, we try to determine the optimized weight ratio for three-component PTCDA:CuPc:PbPc film. As a result, we have implemented a series of weight-ratio studies for the three-component bulk heterojunction films. Different weight ratios of 1:1:1, 1:1:1.5 and 2:1:1.5 films and corresponding devices have been prepared here. As for broad spectral photodetection, the three-component devices with weight ratio of 2:1:1.5 achieve a relatively uniform absorption spectra and higher photocurrent for visible-NIR region (Fig. S1 and Fig. S2 below). Consequently, we think that the three-component device with 2:1:1.5 weight-ratio film exhibits better performance than other devices.

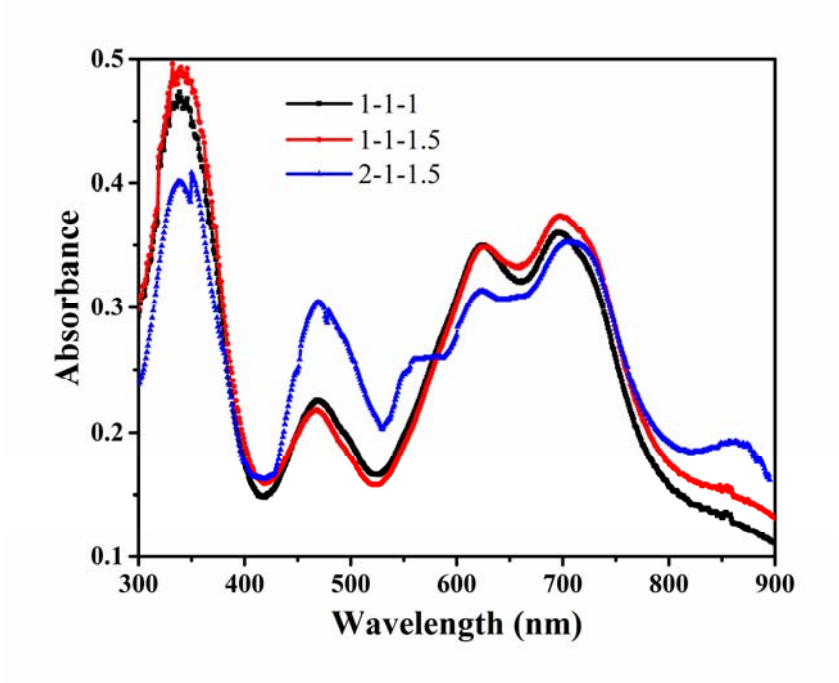

Fig. S1. Optical absorption spectra of PTCDA:CuPc:PbPc films on quartz glasses with different weight ratios of 1:1:1, 1:1:1.5 and 2:1:1.5.

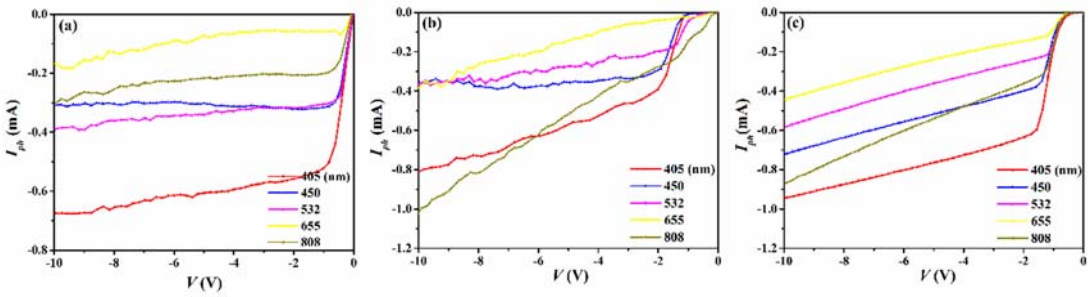

Fig. S2. Dependence of photocurrent I_{ph} on the reverse bias voltage for different-wavelength illumination at incident optical power of ~8.5 μW with different weight ratios of (a) 1:1:1, (b) 1:1:1.5 and (c) 2:1:1.5.