

**Supporting Information for**

**Influence of Blend Composition on Morphology and Exciton-Charge Dynamics in  
MEH-PPV:PMMA Thin Films**

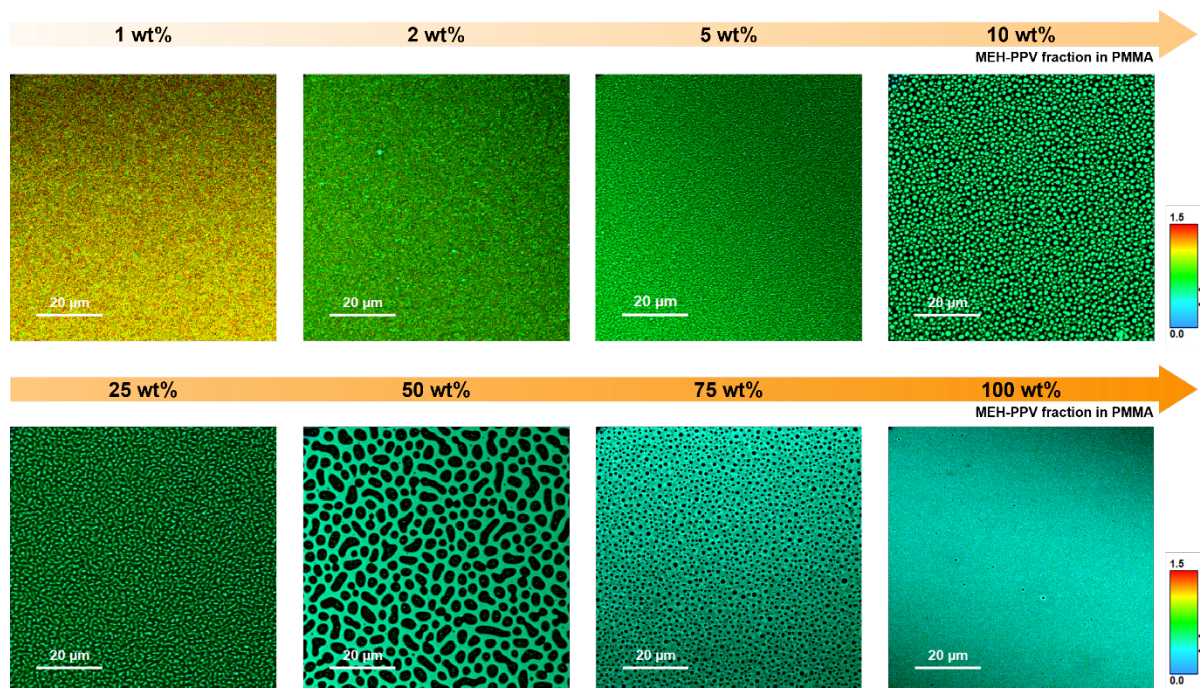
*Jung Won Yoon, Habtom B. Gobeze, and Kirk S. Schanze\**

Department of Chemistry, University of Texas at San Antonio, One UTSA Circle, San Antonio,  
Texas 78249, United States

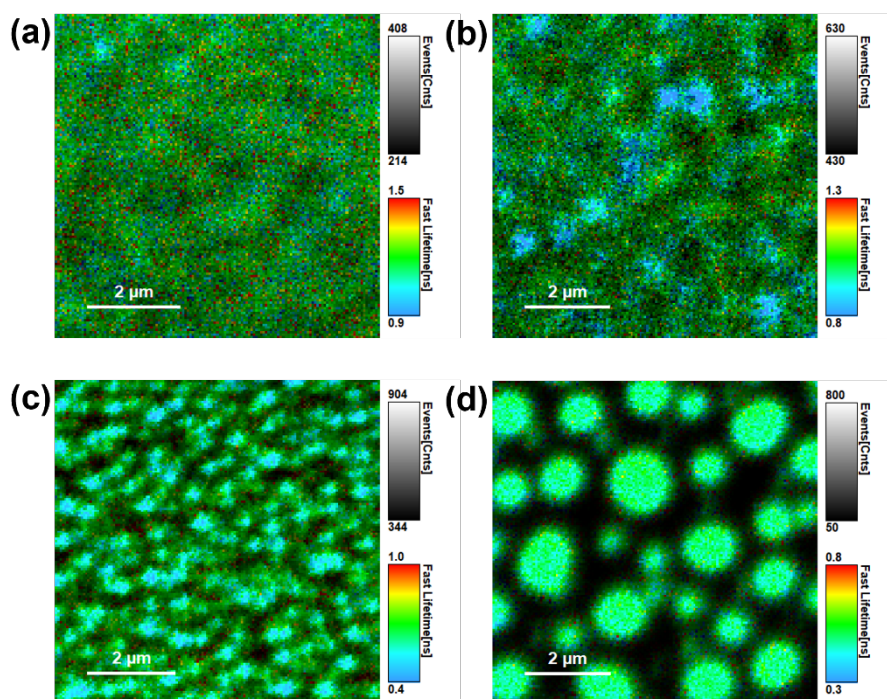
\* Corresponding author: [kirk.schanze@utsa.edu](mailto:kirk.schanze@utsa.edu) (Kirk S. Schanze)

**Table S1.** Peak positions ( $\lambda_{0-0}$ ,  $\lambda_{0-1}$ ) and vibronic intensity ratios ( $I_{00}/I_{01}$ ) extracted from emission spectra of MEH-PPV:PMMA blend films with varying MEH-PPV fractions

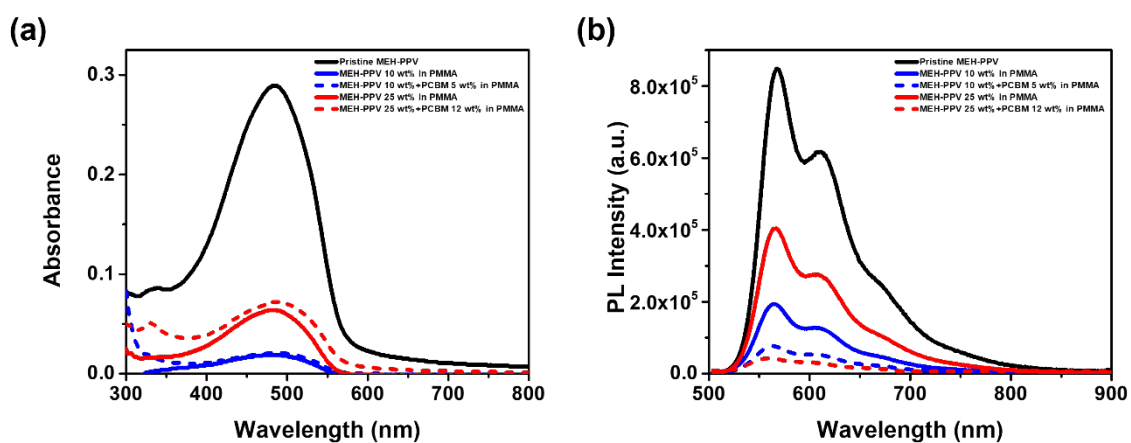
MEH-PPV fraction	$\lambda_{0-0}$ (nm)	$\lambda_{0-1}$ (nm)	$I_{00}/I_{01}$
1 wt%	566	624	1.75
2 wt%	571	623	1.54
5 wt%	578	619	1.36
10 wt%	576	618	1.38
25 wt%	575	614	1.34
50 wt%	570	612	1.34
75 wt%	569	611	1.41
100 wt%	568	611	1.41



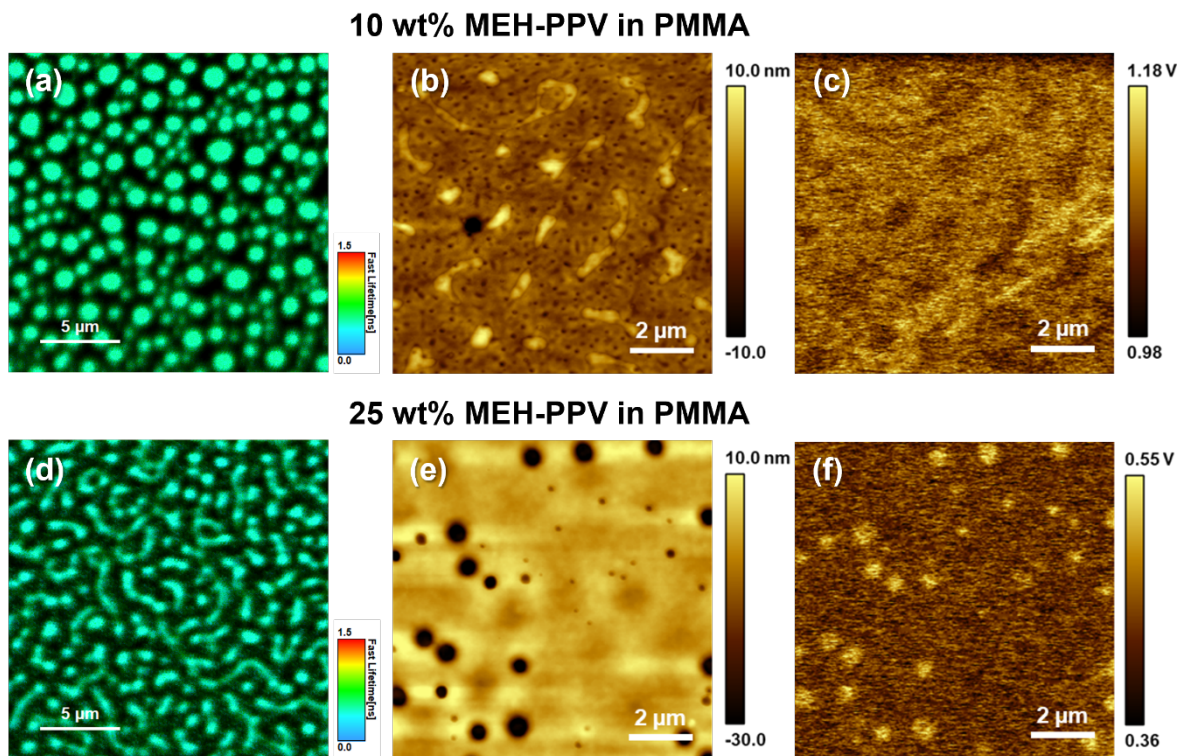
**Figure S1.** Fluorescence lifetime image maps ( $80 \times 80 \mu\text{m}^2$ ) of MEH-PPV:PMMA blend films based on various fractions. Color scale at right (0 – 1.5 ns, blue → green → red).



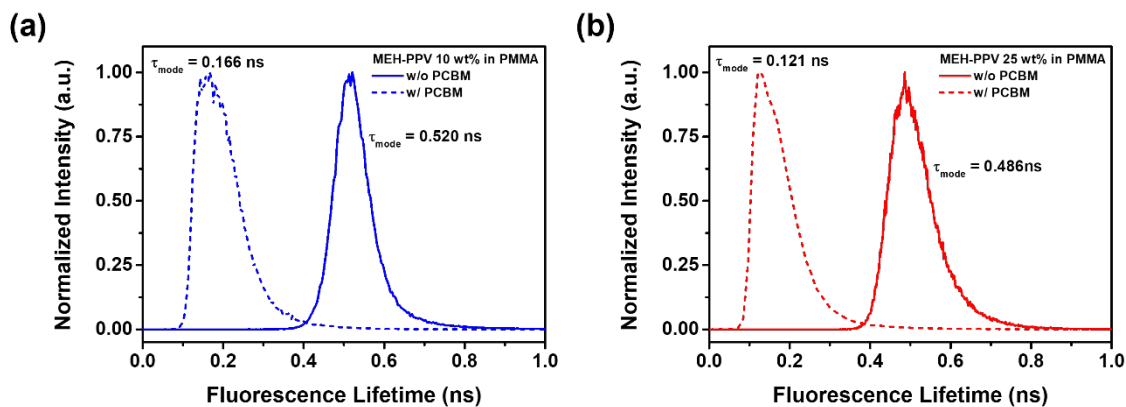
**Figure S2.** Fluorescence lifetime image maps ( $7 \times 7 \mu\text{m}^2$ ) of MEH-PPV:PMMA blend films including (a) 1 wt%, (b) 2 wt%, (c) 5 wt%, and (d) 10 wt% MEH-PPV fractions. Note that the color map scales for this series of images were adjusted to optimize the image contrast for each image.



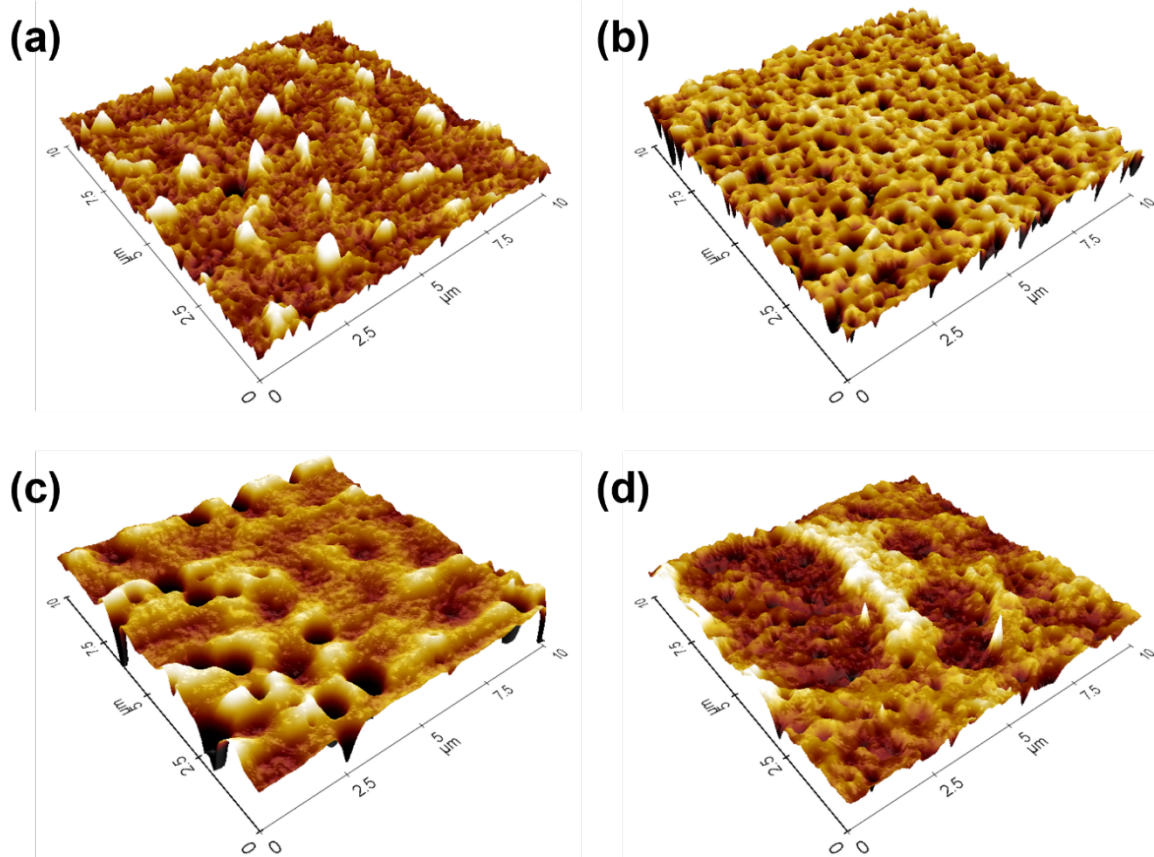
**Figure S3.** (a) Absorption and (b) emission spectra for pristine MEH-PPV, MEH-PPV:PMMA (10:90 wt%), MEH-PPV:PC<sub>61</sub>BM:PMMA (10:5:85 wt%), MEH-PPV:PMMA (25:75 wt%), and MEH-PPV:PC<sub>61</sub>BM:PMMA (25:12:63 wt%).



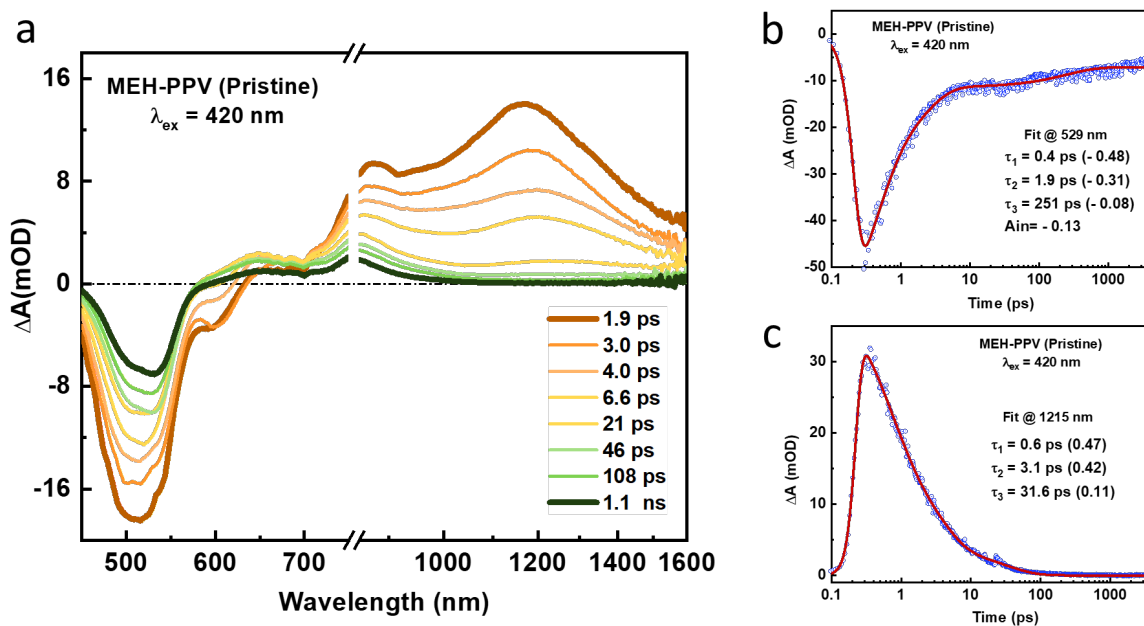
**Figure S4.** (a-d) FLIM, AFM height images, and KPFM surface potential of MEH-PPV:PMMA (10:90 wt%). (e-h) FLIM, AFM height images, and KPFM surface potential of MEH-PPV:PMMA (25:75 wt%).



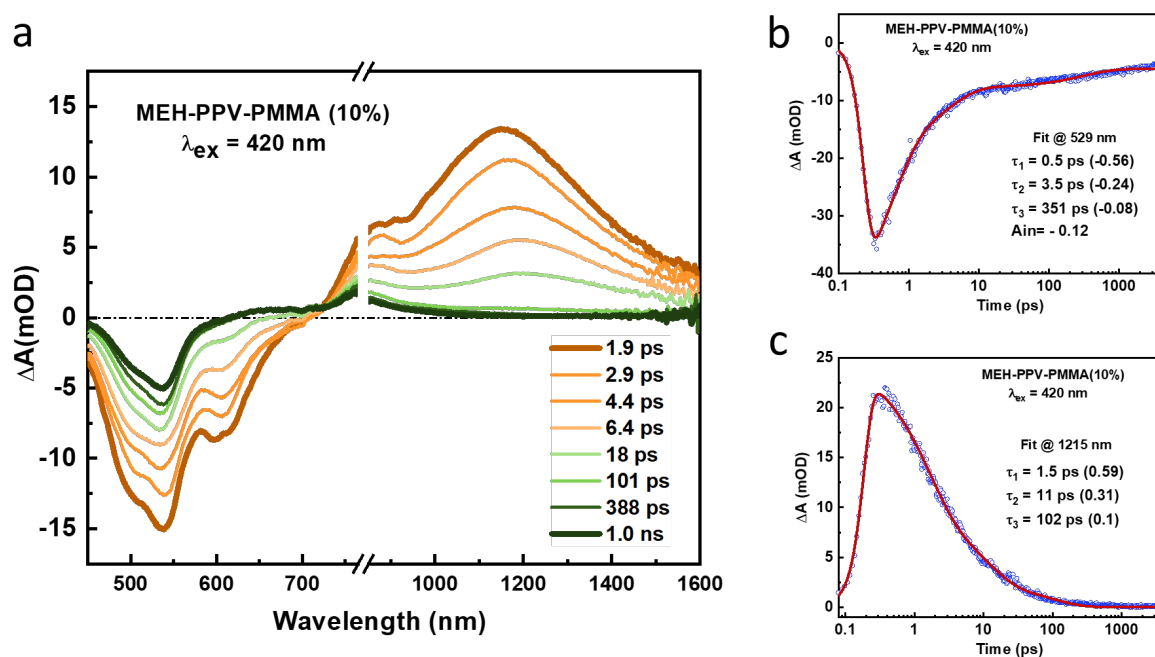
**Figure S5.** Fluorescence lifetime histogram for (a) MEH-PPV:PMMA (10:90 wt%) and MEH-PPV:PC<sub>61</sub>BM:PMMA (10:5:85 wt%), and (b) MEH-PPV:PMMA (25:75 wt%) and MEH-PPV:PC<sub>61</sub>BM:PMMA (25:12:63 wt%). Plots show the frequency of the intensity-weighted mean photon arrival time (fast lifetime) in the sampled image areas.



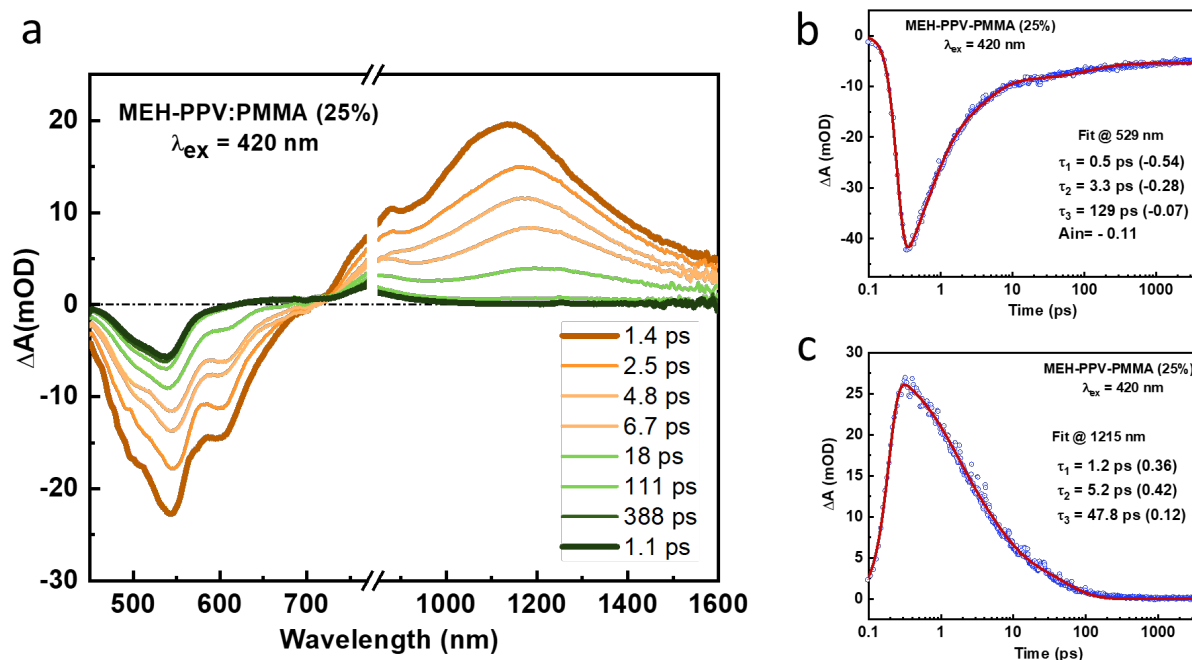
**Figure S6.** Three-dimensional AFM height maps of (a) MEH-PPV:PMMA (10:90 wt%), (b) MEH-PPV:PC<sub>61</sub>BM:PMMA (10:5:85 wt%), (c) MEH-PPV:PMMA (25:75 wt%), and (d) MEH-PPV:PC<sub>61</sub>BM:PMMA (25:12:63 wt%) corresponding to the two-dimensional height images.



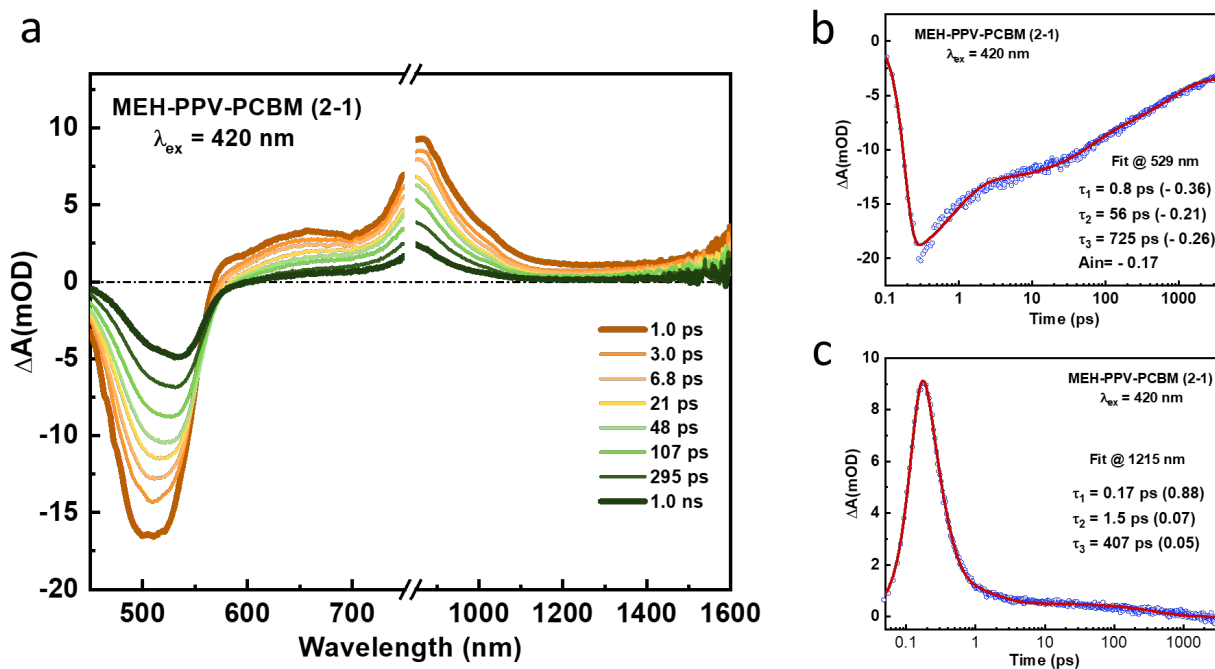
**Figure S7.** (a) Femtosecond TA spectra of pristine MEH-PPV film excited at 420 nm. Delay times shown in legend. TA decay kinetics monitored at (a) 529 nm and (b) 1215 nm. Parameters obtained from fits of the decays are shown in inset. Numbers in parenthesis are normalized amplitudes of the decay lifetime components.



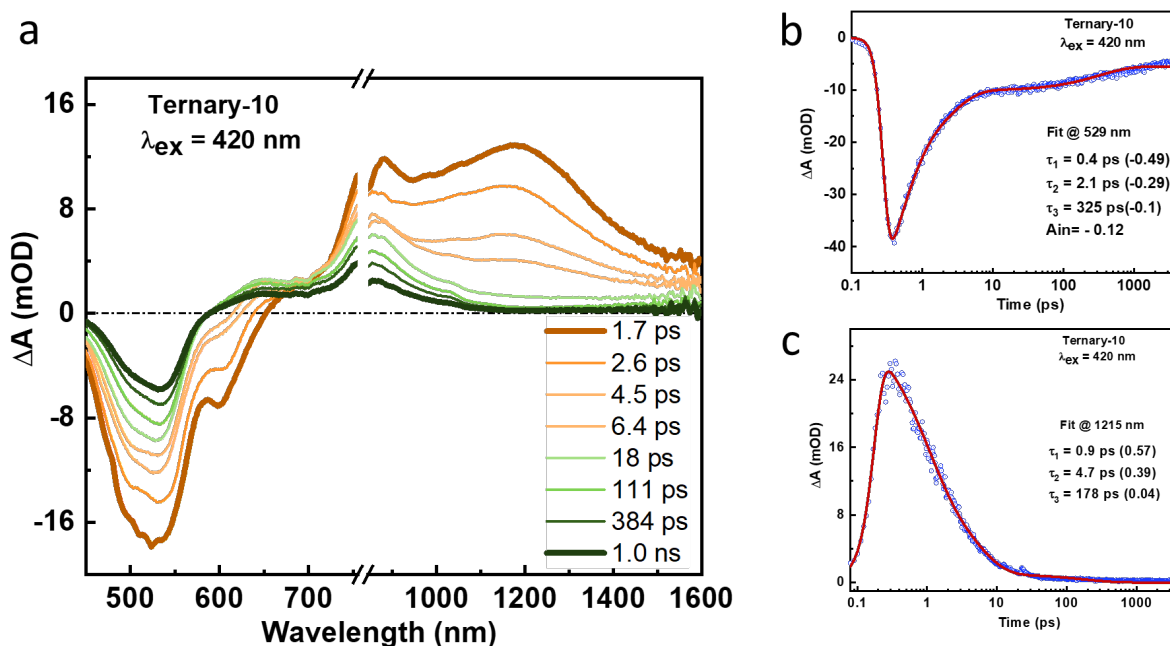
**Figure S8.** (a) Femtosecond TA spectra of pristine 10% MEH-PPV:PMMA binary blend film excited at 420 nm. Delay times shown in legend. TA decay kinetics monitored at (a) 529 nm and (b) 1215 nm. Parameters obtained from fits of the decays are shown in inset. Numbers in parenthesis are normalized amplitudes of the decay lifetime components.



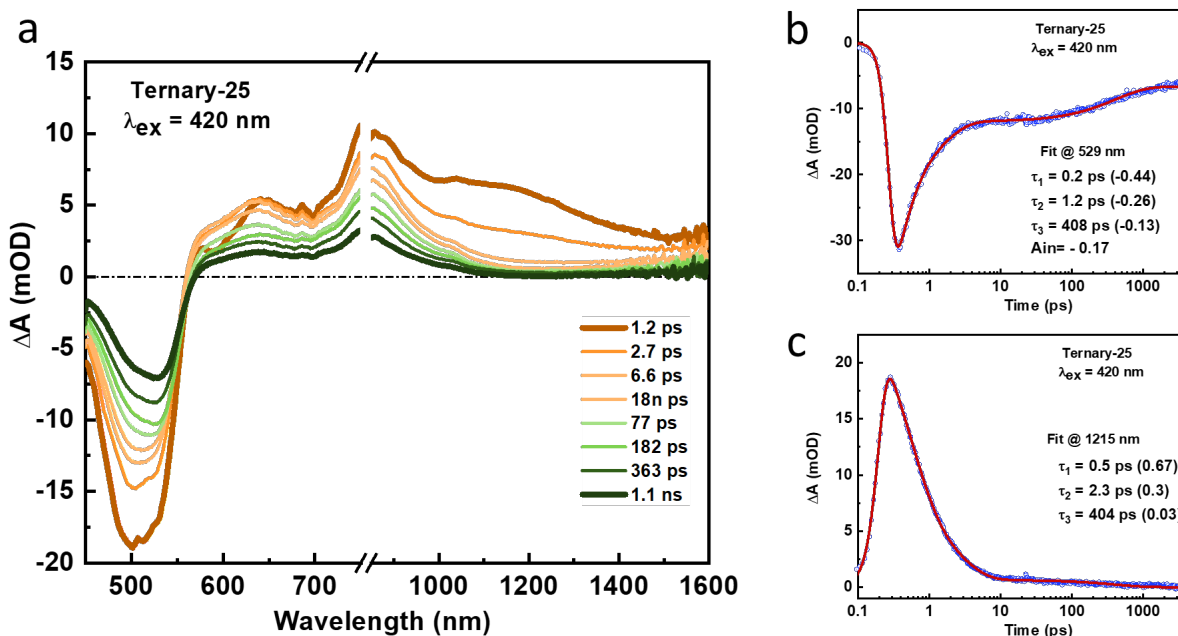
**Figure S9.** (a) Femtosecond TA spectra of pristine 25% MEH-PPV:PMMA binary blend film excited at 420 nm. Delay times shown in legend. TA decay kinetics monitored at (a) 529 nm and (b) 1215 nm. Parameters obtained from fits of the decays are shown in inset. Numbers in parenthesis are normalized amplitudes of the decay lifetime components.



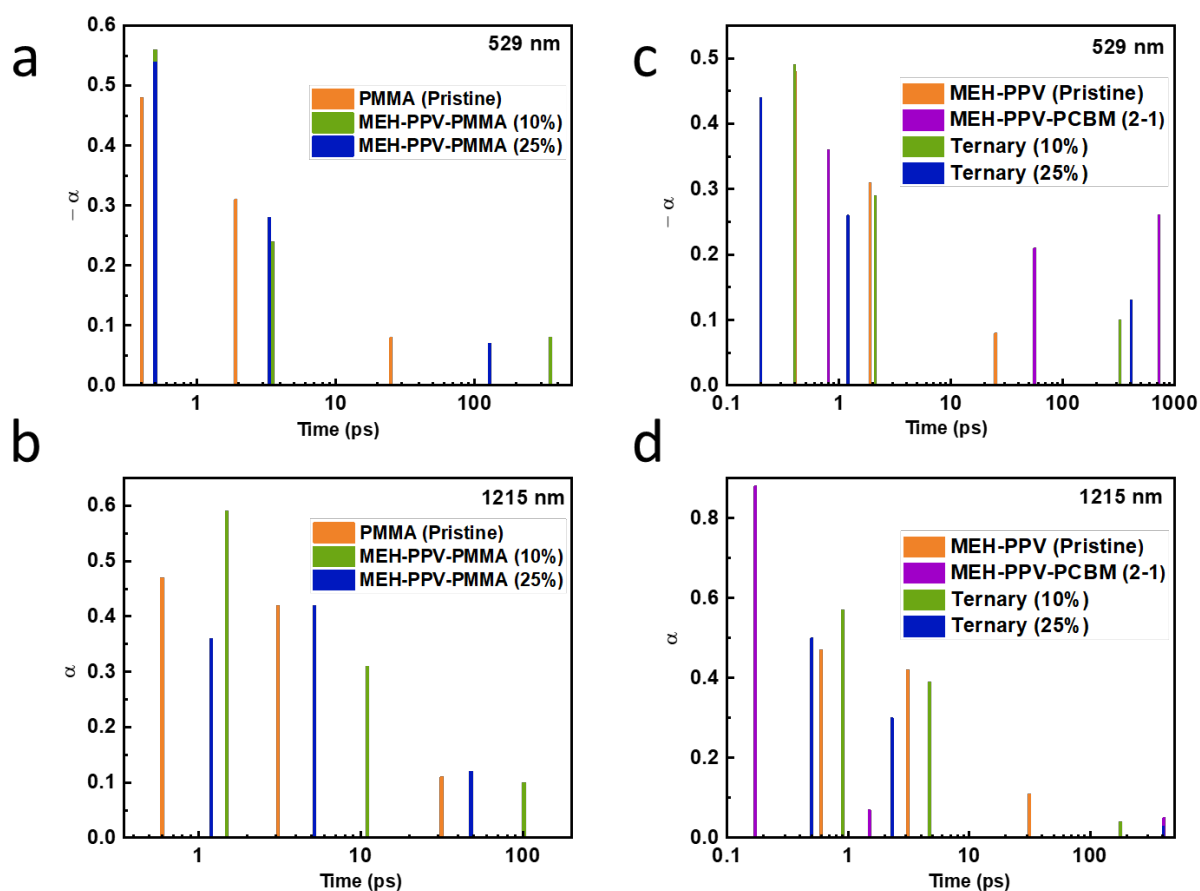
**Figure S10.** (a) Femtosecond TA spectra of pristine 2:1 MEH-PPV:PCBM blend film excited at 420 nm. Delay times shown in legend. TA decay kinetics monitored at (a) 529 nm and (b) 1215 nm. Parameters obtained from fits of the decays are shown in inset. Numbers in parenthesis are normalized amplitudes of the decay lifetime components.



**Figure S11.** (a) Femtosecond TA spectra of pristine MEH-PPV/PC<sub>61</sub>BM:PMMA (10:5:85) ternary blend film excited at 420 nm. Delay times shown in legend. TA decay kinetics monitored at (a) 529 nm and (b) 1215 nm. Parameters obtained from fits of the decays are shown in inset. Numbers in parenthesis are normalized amplitudes of the decay lifetime components.



**Figure S12.** (a) Femtosecond TA spectra of pristine MEH-PPV/PC<sub>61</sub>BM:PMMA (25:12:63) ternary blend film excited at 420 nm. Delay times shown in legend. TA decay kinetics monitored at (a) 529 nm and (b) 1215 nm. Parameters obtained from fits of the decays are shown in inset. Numbers in parenthesis are normalized amplitudes of the decay lifetime components.

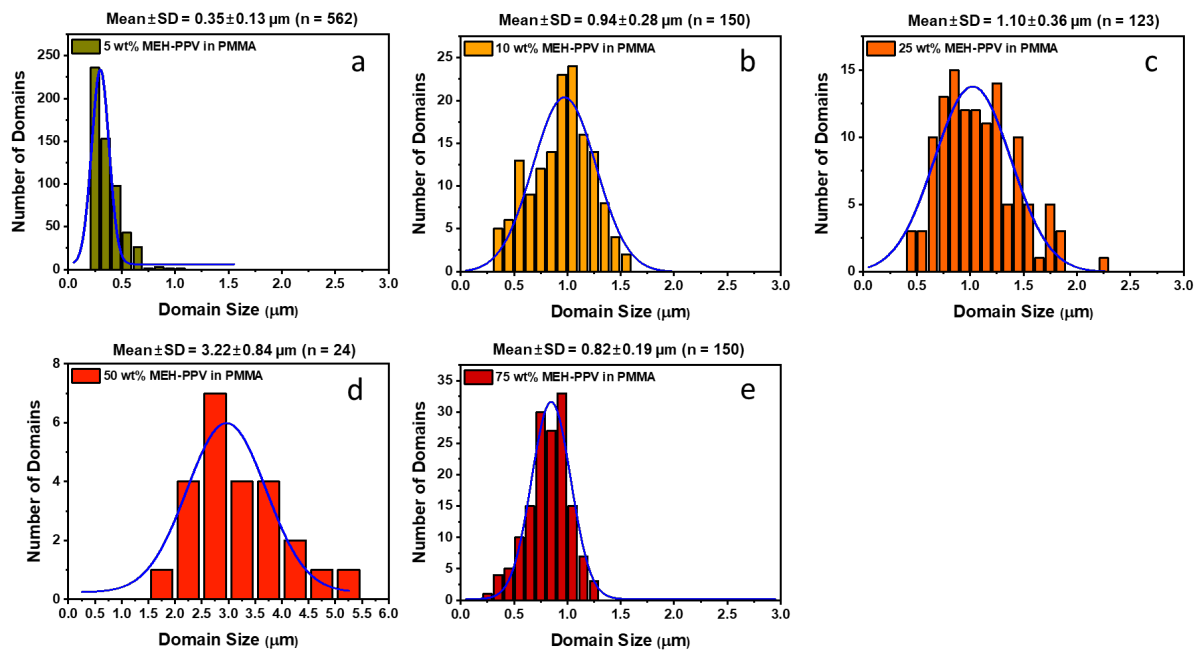


**Figure S13.** Plots of lifetimes and amplitudes for multiexponential fits of the TA kinetics at selected wavelengths. Fits according to the equation  $\Delta A = \sum \alpha_i \tau_i$ . Length of bars represent the normalized amplitudes ( $\alpha_i$ ) and position represents lifetime ( $\tau_i$ ) of the three components for each film ( $i = 1, 2$  and  $3$ ). (a) and (b) TA kinetics at 529 and 1215 nm for pristine MEH-PPV and MEH-PPV:PMMA binary blend films. (c) and (d) TA kinetics at 529 and 1215 nm for binary and ternary blends with PC<sub>61</sub>BM. Numerical values used for the graphs are provided in Table S2, and the fitted decays are shown in Figures S7 – S12.

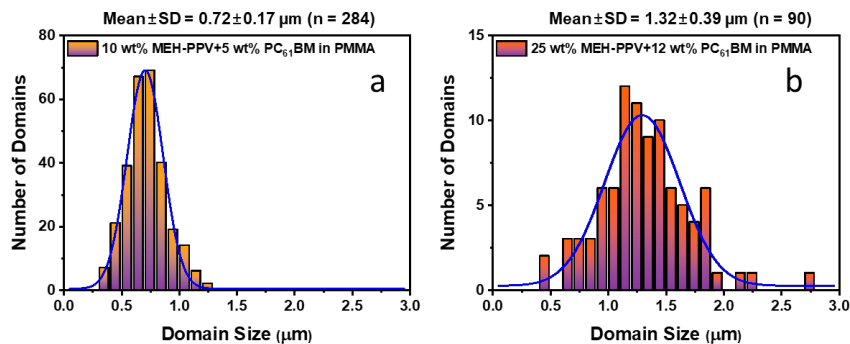
**Table S2.** Parameters obtained from TA decay fits <sup>a</sup>

Film	529 nm			1215 nm		
	$\tau_1$ /ps	$\tau_2$ /ps	$\tau_3$ /ps	$\tau_1$ /ps	$\tau_2$ /ps	$\tau_3$ /ps
C1	0.4 (-0.48)	1.9 (-0.31)	25 (-0.08)	0.6 (0.47)	3.1 (0.42)	31.6 (0.11)
Binary_10%	0.5 (-0.56)	3.5 (-0.24)	351 (-0.08)	1.5 (0.59)	11 (0.31)	102 (0.1)
Binary_25%	0.5 (-0.54)	3.3 (-0.28)	129 (-0.07)	1.2 (0.36)	5.2 (0.42)	47.8 (0.12)
C1	0.4 (-0.48)	1.9 (-0.31)	25 (-0.08)	0.6 (0.47)	3.1 (0.42)	31.6 (0.11)
C2	0.8 (-0.36)	56 (-0.21)	725 (-0.26)	0.17 (0.88)	1.5 (0.07)	407 (0.05)
Ternary_10%	0.4 (-0.49)	2.1 (-0.29)	325 (-0.1)	0.9 (0.57)	4.7 (0.39)	178 (0.04)
Ternary_25%	0.2 (-0.44)	1.2 (-0.26)	408 (-0.13)	0.5 (0.67)	2.3 (0.3)	404 (0.03)

<sup>a</sup> Fits according to the equation  $\Delta A = \sum \alpha_i \tau_i$ . Normalized amplitudes are shown in parenthesis.



**Figure S14.** Size distribution histograms for domains in fluorescence microscope images from Figure 2a in main text. a) 5% MEH-PPV/PMMA, MEH-PPV domains. b) 10% MEH-PPV/PMMA, MEH-PPV domains. c) 25% MEH-PPV/PMMA, MEH-PPV domains. d) 50% MEH-PPV/PMMA, PMMA domains. e) 75% MEH-PPV/PMMA, PMMA domains.



**Figure S15.** Size distribution histograms for domains in fluorescence microscope images from Figures 3a and 3d in main text. a) 10% MEH-PPV + 5% PC<sub>61</sub>BM in PMMA, MEH-PPV domains. b) 25% MEH-PPV + 12% PC<sub>61</sub>BM in PMMA, MEH-PPV domains.