

Supplementary Information

Plasmon-enhanced Triplet-Triplet Annihilation using Silver Nanoplates

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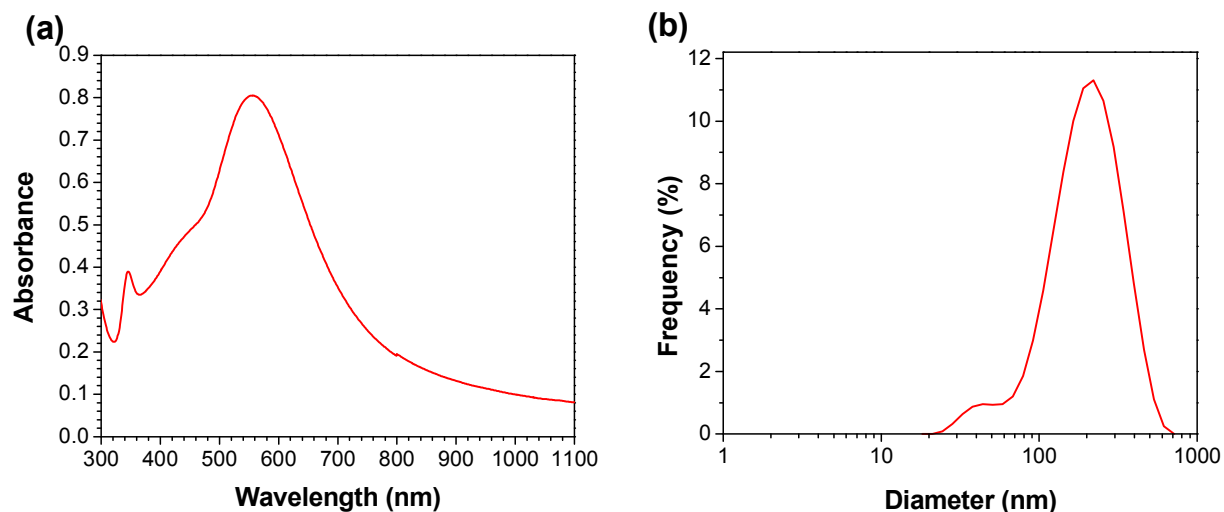


Figure S1. (a) Absorption spectrum (acquired using a 1-mm width cuvette) and (b) size distribution (from dynamic light scattering data) of the AgNPs after functionalization and phase transfer to chloroform. The peak and O.D. of the LSPR band in (a) are 556 nm and 0.81, respectively.

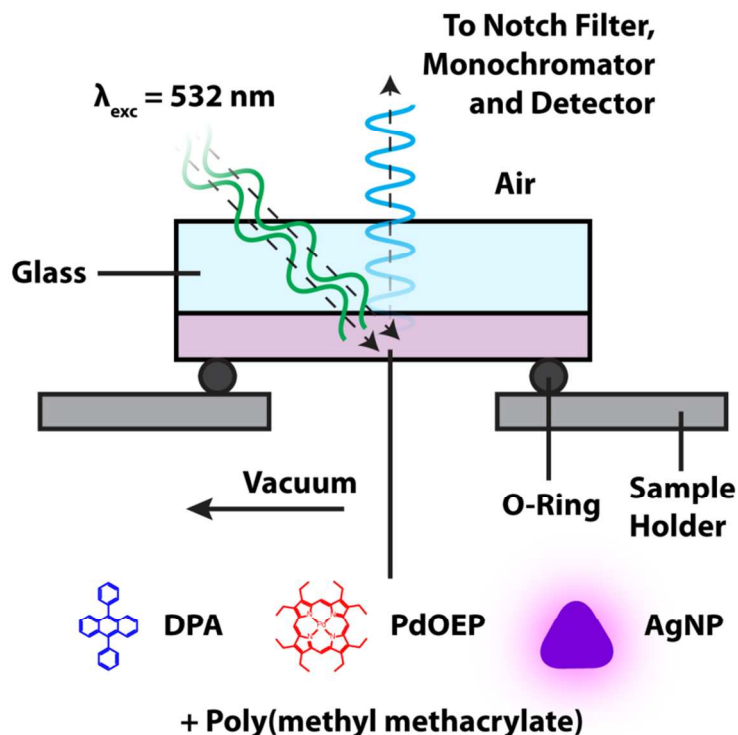


Figure S2. Schematic of the sample holder used in the photon upconversion measurements.

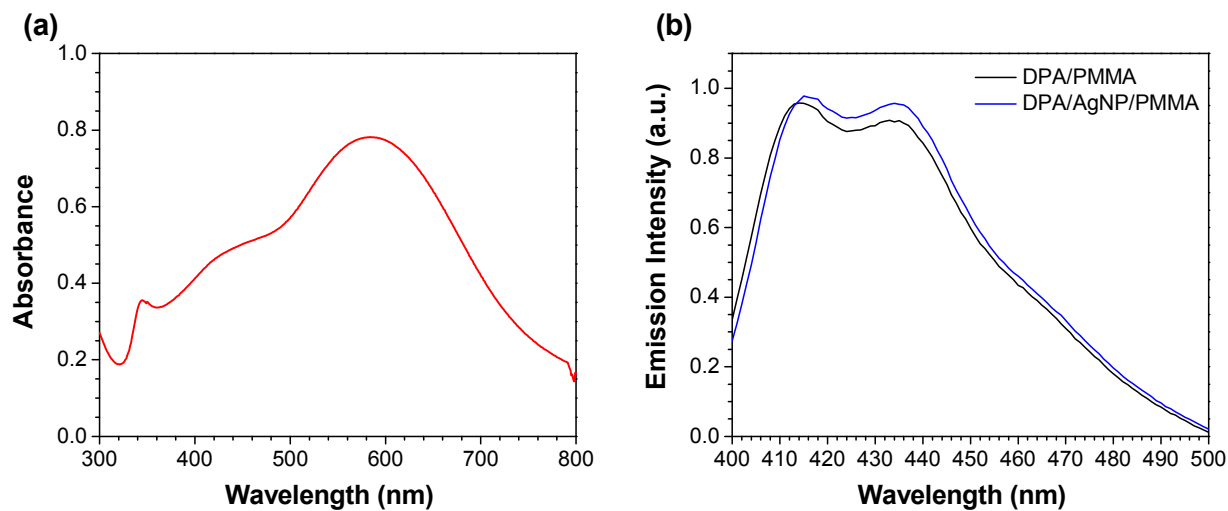


Figure S3. (a) UV-vis absorption spectrum of a second batch of silver nanoplates in chloroform solution; (b) emission spectra for both DPA/PMMA and DPA/AgNP/PMMA films ($\lambda_{\text{exc}} = 350$ nm). The spectra in (b) are average data acquired by measuring four separate films for both the DPA/PMMA and DPA/AgNP/PMMA samples.

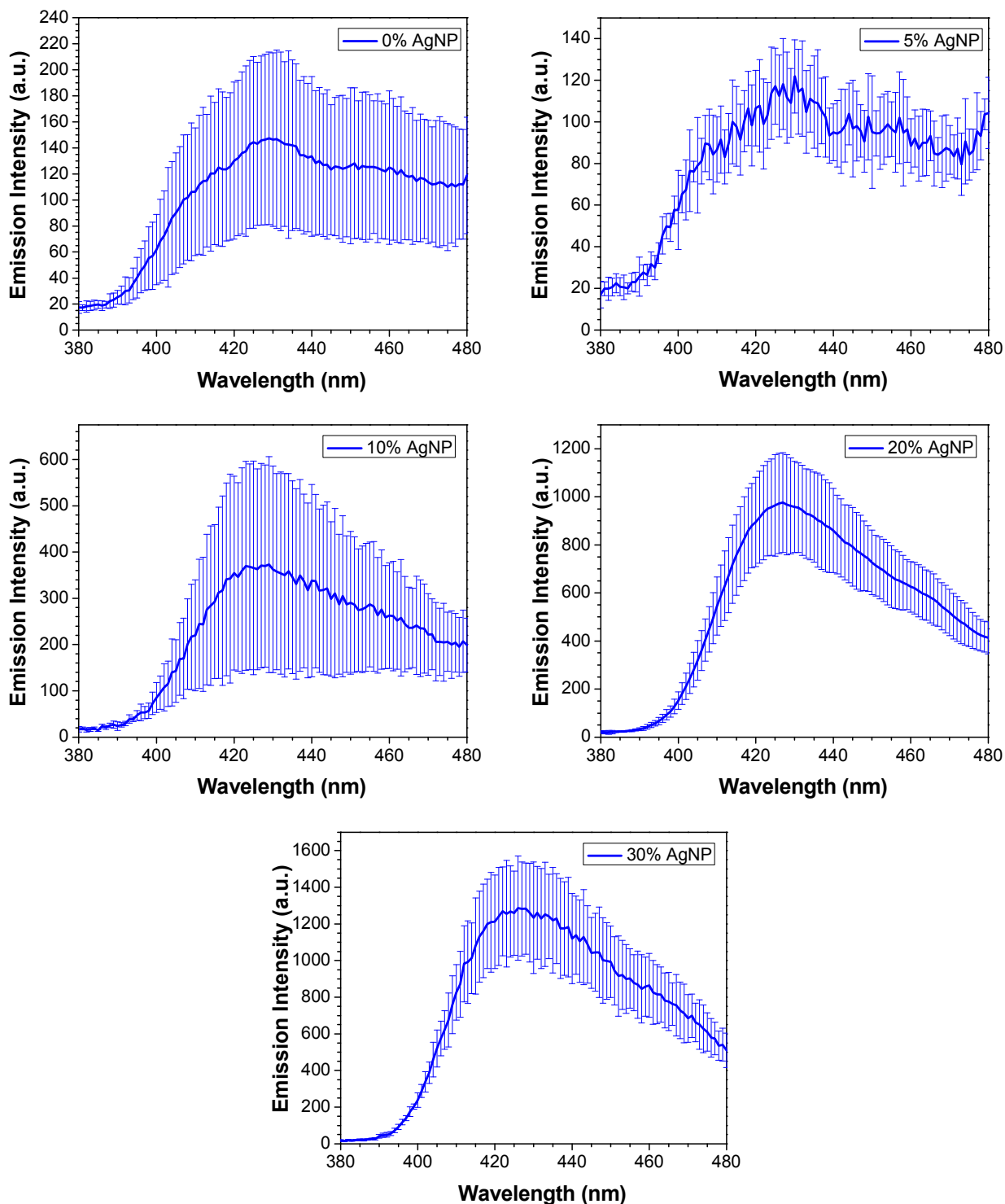


Figure S4. Emission spectra (in the DPA fluorescence region) for films prepared with varying AgNP loadings. Spectra are the average of either 20 (0% AgNP), 6 (5 – 20% AgNP) or 5 (30% AgNP) separate films. The error bars represent plus or minus one standard deviation from the mean.

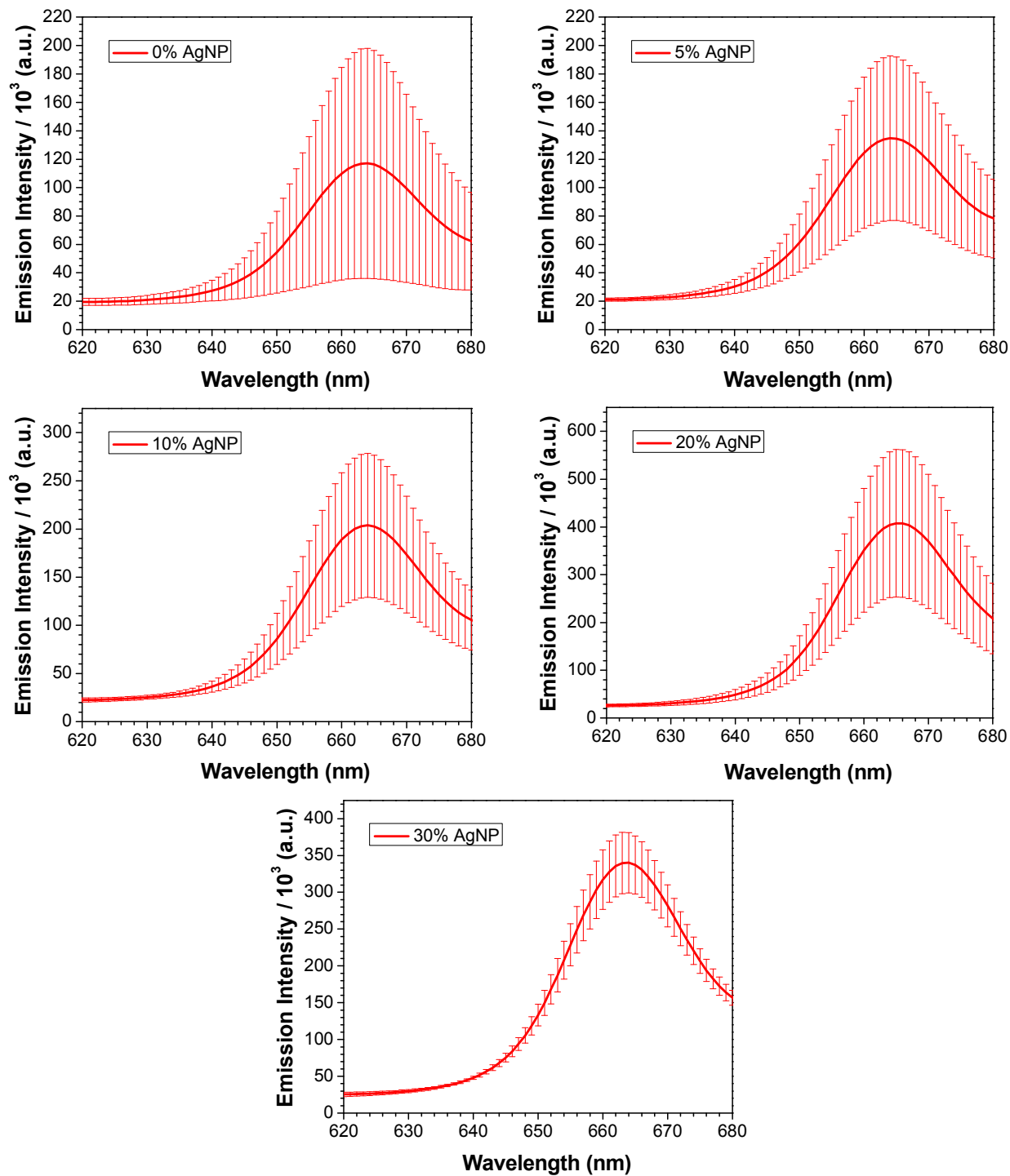


Figure S5. Emission spectra (in the PdOEP phosphorescence region) for films prepared with varying AgNP loadings. Spectra are the average of either 20 (0% AgNP), 6 (5 – 20% AgNP) or 5 (30% AgNP) separate films. The error bars represent plus or minus one standard deviation from the mean.

Table S1. Single factor ANOVA test at the 95% confidence level to determine whether the upconversion and phosphorescence emission intensities depend on the AgNP loading. In both cases, $F > F_{\text{critical}}$, implying a statistically significant dependence.

	F (Statistic)	P-value	F (Critical)
Upconversion	76	1.3×10^{-17}	2.6
Phosphorescence	14	6.8×10^{-6}	2.8

Table S2. Pairwise student t-tests at the 95% confidence level to determine whether the upconversion emission intensities differ between AgNP loadings. Compared to the controls (0.0% loading), the samples containing 20% and 30% AgNPs show a statistically significant increase in intensity ($t > t_{\text{critical}}$).

	t (Statistic) two-tail	P-value	t (Critical) two-tail
0.0% and 5.0%	1.5	1.5×10^{-1}	2.1
0.0% and 10%	2.3	6.6×10^{-2}	2.6
0.0% and 20%	10	1.5×10^{-4}	2.6
0.0% and 30%	7.9	1.4×10^{-3}	2.8
5.0% and 10%	2.6	4.6×10^{-2}	2.6
10% and 20%	5.0	5.6×10^{-4}	2.2
20% and 30%	1.8	1.3×10^{-1}	2.4

Table S3. Pairwise student t-tests at the 95% confidence level to determine whether the phosphorescence emission intensities differ between AgNP loadings. Compared to the controls (0.0% loading), the samples containing 20% and 30% AgNPs show a statistically significant increase in intensity ($t > t_{\text{critical}}$).

	t (Statistic) two-tail	P-value	t (Critical) two-tail
0.0% and 5.0%	0.41	7.0×10^{-1}	2.4
0.0% and 10%	1.8	1.0×10^{-1}	2.3
0.0% and 20%	4.7	1.6×10^{-3}	2.3
0.0% and 30%	5.5	1.5×10^{-3}	2.4
5.0% and 10%	1.8	1.1×10^{-1}	2.3
10% and 20%	3.6	7.4×10^{-3}	2.3
20% and 30%	1.6	1.6×10^{-1}	2.4

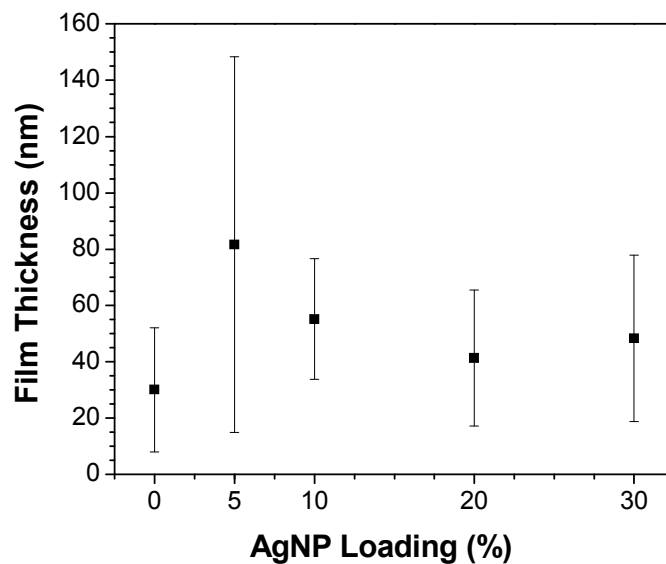


Figure S6. Average film thickness (as measured by profilometry) for the films used in this study. Measurements were made on either 3 (0% AgNP) or 2 (5 – 30% AgNP) separate films, and each film was measured multiple times.

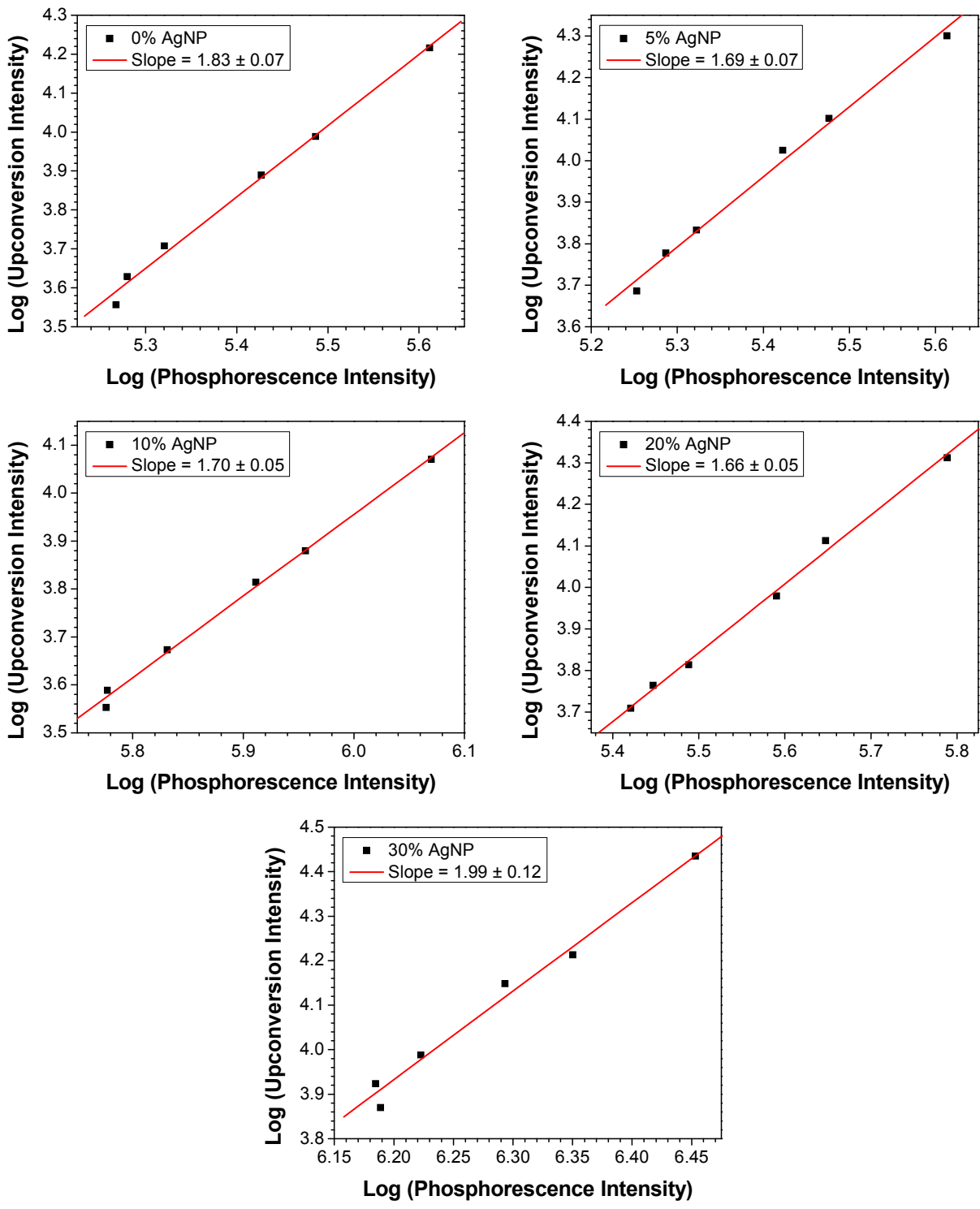


Figure S7. Power dependency measurements for films made using different AgNP loadings. Each dataset is the average of measurements on two separate films.

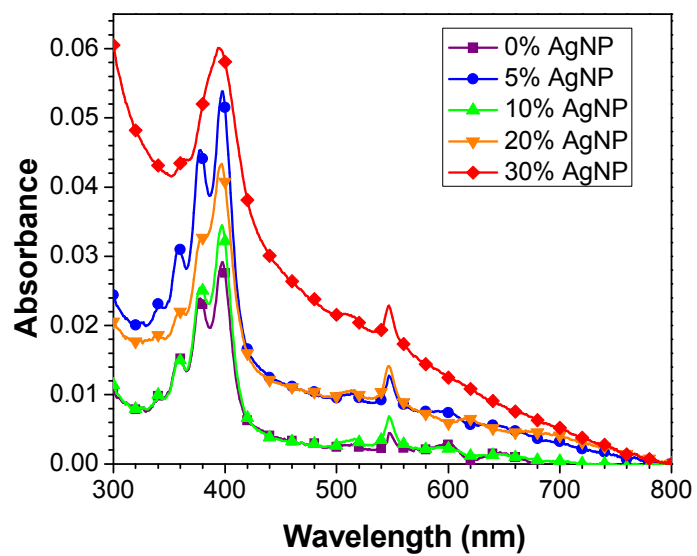


Figure S8. Representative UV-vis absorption spectra for the PdOEP/DPA/AgNP/PMMA thin films.