Supplementary Information

1. Example of statistical analysis of layer thickness

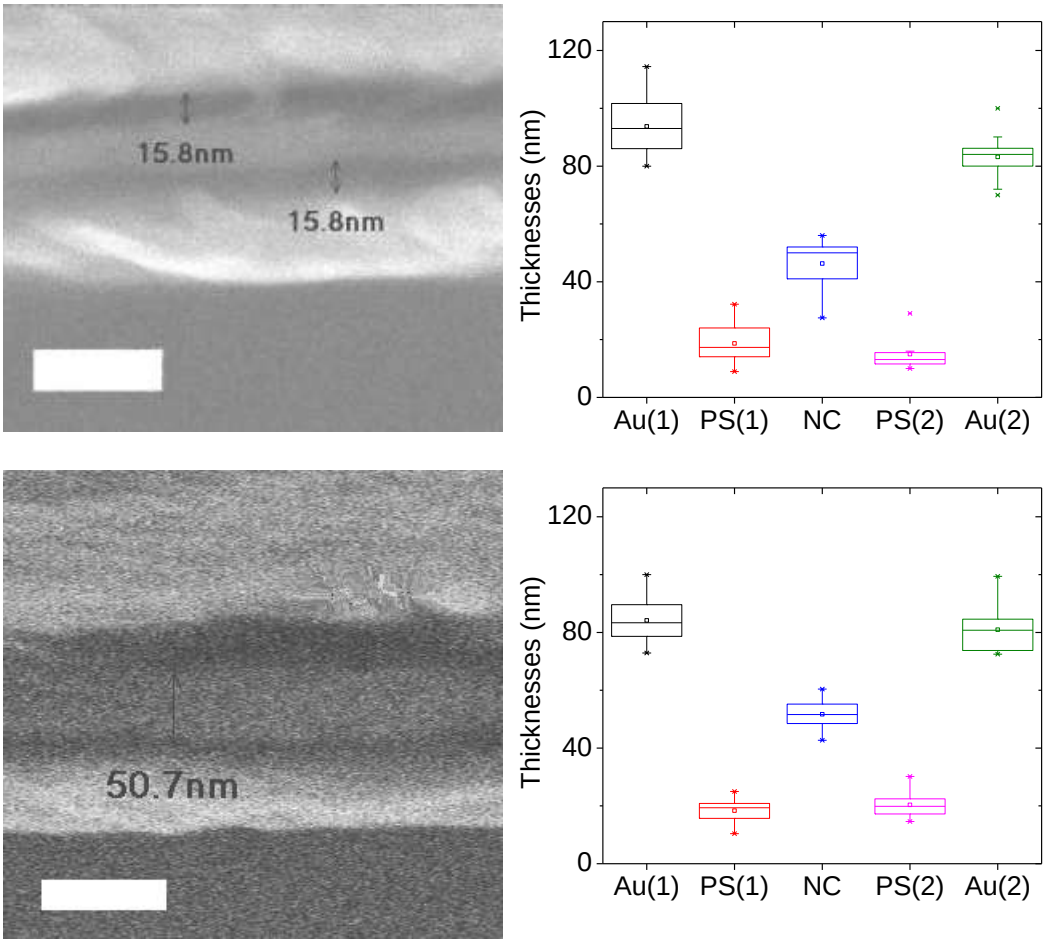

Figure S1. Statistical analysis of layer thicknesses of two separate 50nm-thick $CsPbBr_3$ MEM structure, showing the repeatability of layer thicknesses across two separate samples.

2. Schematic of reference sample in PL and TRPL measurements

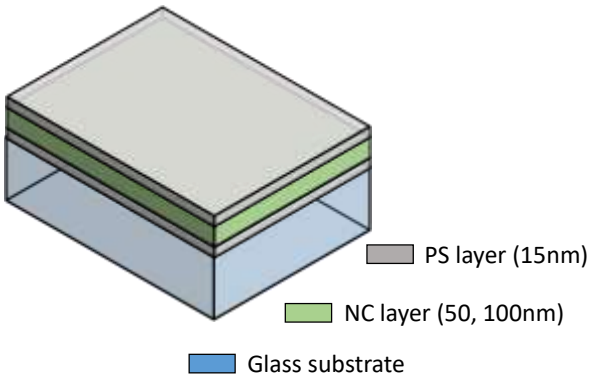

Figure S2. Schematic of reference sample in PL and TRPL measurements

3. Transmittance of metal-emitter and metal-emitter-metal structures

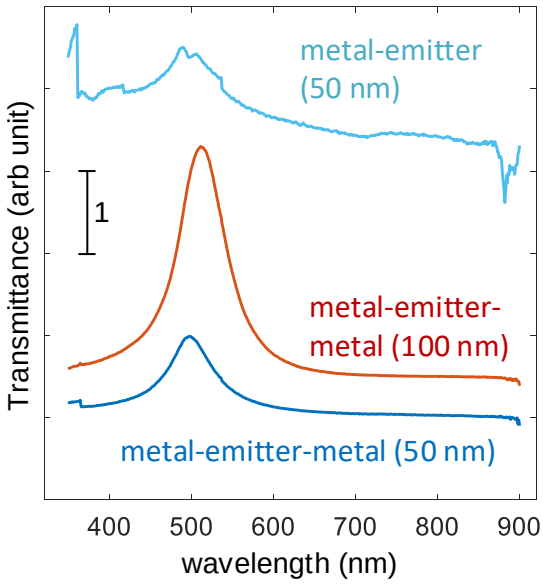

Figure S3. Transmittance of the CsPbBr3 film in metal-emitter (50 nm thickness) and metal-emitter-metal (50nm and 100 nm thickness) configurations.

4. Comparison with system without PS spacer layer

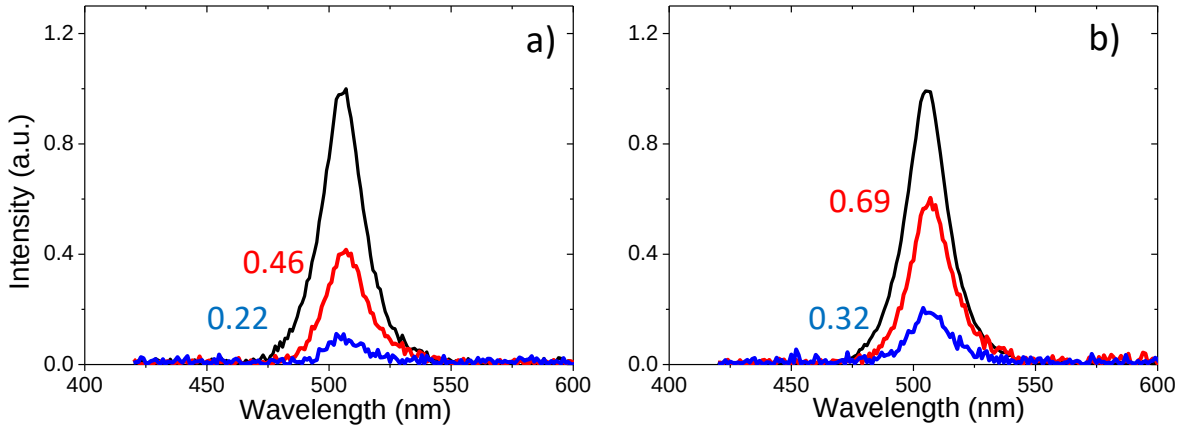

Figure S4. Photoluminescence (PL) spectra of $CsPbBr_3$ NC-Au layers (without PS) at room temperature (RT). Spectra from layers with $CsPbBr_3$ NC films of (**a**) 50- and (**b**) 100-nm thick. The black, red, and blue lines correspond to $CsPbBr_3$ NC film reference, single-Au, and double-Au layers, respectively. The coloured numbers indicate the ratios of integrated intensities in comparison to those of the references.

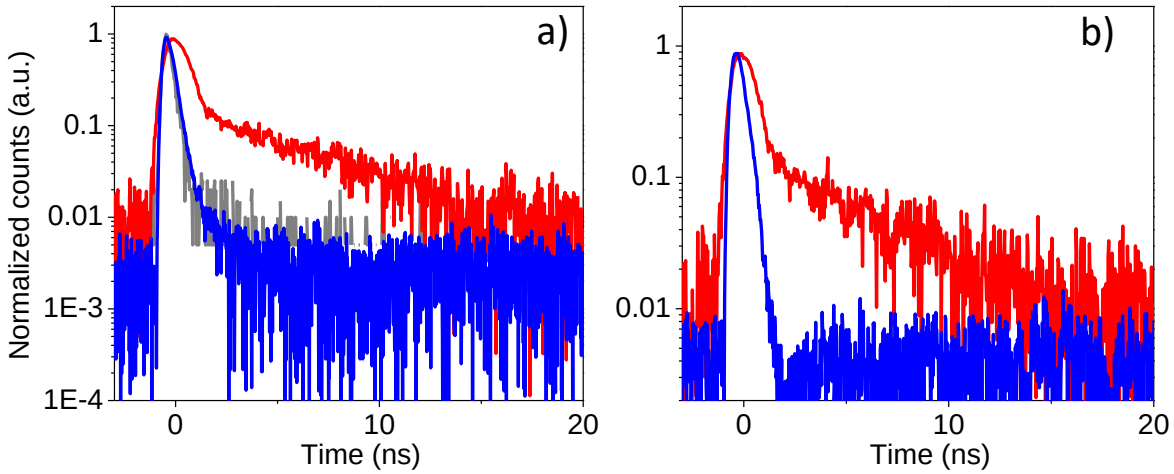

Figure S5. Time-resolved emission of $CsPbBr_3$ NC film with Au. Decay curves of single-Au- (red), and double-Au-NC samples (blue) measured for (**a**) 50- and (**b**) 100-nm-thick $CsPbBr_3$ NCs. The grey line is the instrument response function.

5. Emission rate calculation

The TRPL decay curves in Figure 3(d) were fitted with two exponential functions using the following equation:

$$N(t) = N_1(0)\exp\left(\frac{-t}{\tau_1}\right) + N_2(0)\exp\left(\frac{-t}{\tau_2}\right) \qquad (S2-S1)$$

where *N(t)* is the total number of populations from all emission channels after t time. $N_1(0)$ and $N_2(0)$ are the initial population at t = 0, which represent emission lifetimes for fast and slow channels of τ_1 and τ_2, respectively.

The weightage of each decay component given by:

$$W_i(\%) = \frac{A_i t_i}{\sum A_i t_i}.100\% \qquad (S2-S2)$$

The average emission lifetime τ_{ave} is given by:

$$\tau_{ave} = \frac{\sum(W_i(\%) \times \tau_i)}{100\%} \qquad (S2-S3)$$

Table S1 shows key parameters derived from fitting and the emission rate γ_{total} is calculated using the following equation:

$$\gamma_{total} = \frac{1}{\tau_{ave}} \qquad (S2-S4)$$

where τ_i and A_i are decay times and amplitudes from fitted TRPL decay curves with two exponential decay function.

Table S1: Key parameters of time resolved PL spectrum

NC layer	NC layer thickness	Metal layer	τ_{ave}(ns)	τ_1(ns)	W_1 (%)	τ_2(ns)	W_2 (%)
$CsPbBr_3$	50nm	none	6.0 ± 3.6	2.1	21	7.1	79
		single	3.0 ± 1.7	1.3	32	3.8	68
		double	1.4 ± 0.8	0.6	28	1.7	72
$CsPbBr_3$	100nm	none	7.9 ± 4.9	2.2	17	9.1	83
		single	4.5 ± 2.8	1.4	21	5.4	79
		double	2.7 ± 1.7	0.7	17	3.1	93
$FAPbBr_3$	50nm	none	24.2 ± 16.1	3.2	9	26.4	91
		single	10.0 ± 6.6	1.4	10	11.0	90
		double	4.5 ± 3.0	0.6	10	4.9	90
$FAPbBr_3$	100nm	none	25.5 ± 17.0	3.2	10	27.8	90
		single	14.6 ± 9.7	2.0	11	16.2	89
		double	6.1 ± 4.1	0.8	9	6.7	91