Supplementary Information

Enhanced amplified spontaneous emission from morphology-controlled organic-inorganic halide perovskite films

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Fig. S1. XRD patterns of DMF and DMSO based PbI₂ films.
Fig. S2. Cross-sectional SEM images of perovskite films converted from the PbI$_2$ films spin coated from the binary solvent (DMF:DMSO) solutions in 10:0 (a), 8:2 (b), 6:4 (c), 4:6 (d), 2:8 (e), and 0:10 (f) ratios.
Fig. S3. Histogram of average particle size ($S_p$) for each perovskite thin film from the SEM images.
Fig. S4. AFM images of perovskite films converted from the PbI$_2$ films spin coated from the binary solvent (DMF:DMSO) solutions in 10:0 (a), 8:2 (b), 6:4 (c), 4:6 (d), 2:8 (e), and 0:10 (f) ratios. The bottom curve is the roughness profile along the corresponding red line in each figure.
Fig. S5. UV-vis absorption spectra of PbI₂ films fabricated from DMF:DMSO binary solution in 10:0, 8:2, 6:4, 4:6, 2:8, and 0:10 ratios (v/v).
Fig. S6. PLQE of MAPbI$_3$ perovskite films based on PbI$_2$ (solvent) layers which prepared by binary solvent in different ratio.