Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Temperature-dependent excitonic emission characteristics of lead-free inorganic double perovskites and their third-order optical nonlinearities

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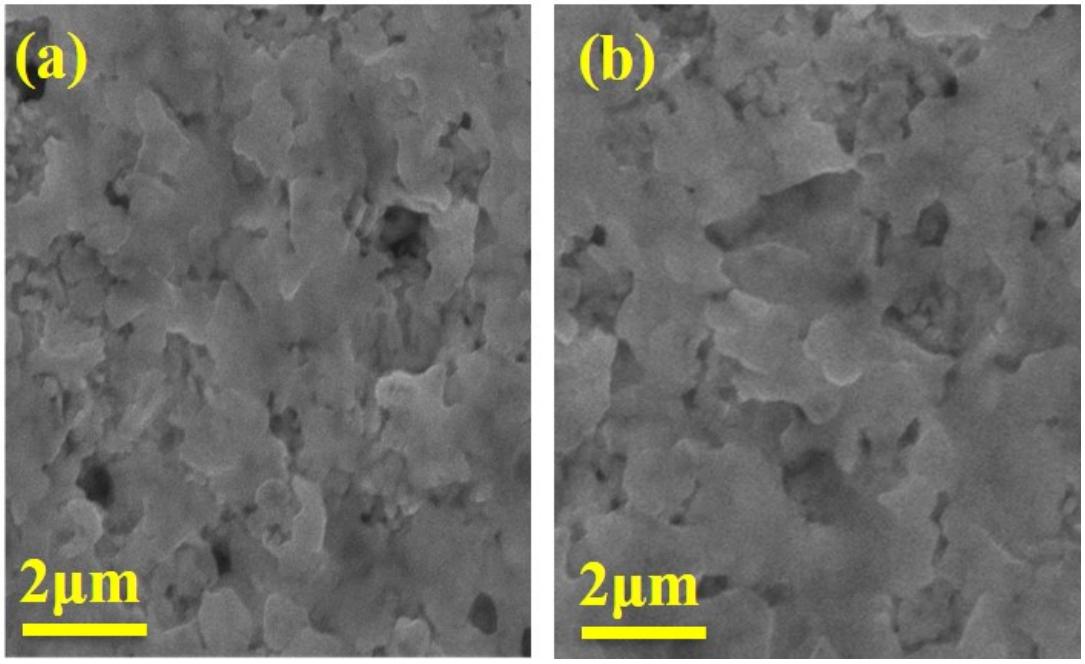
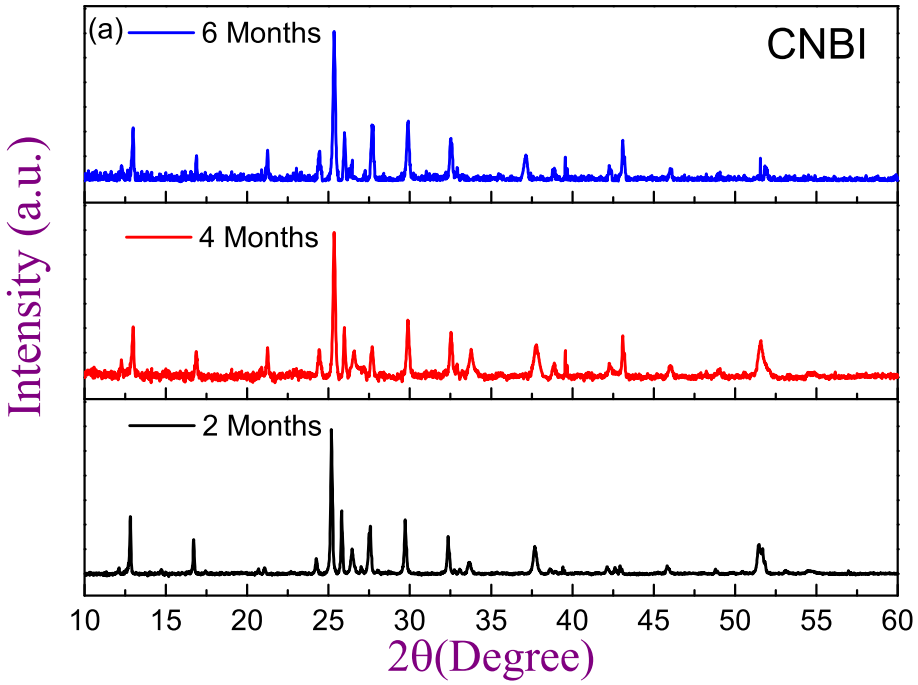
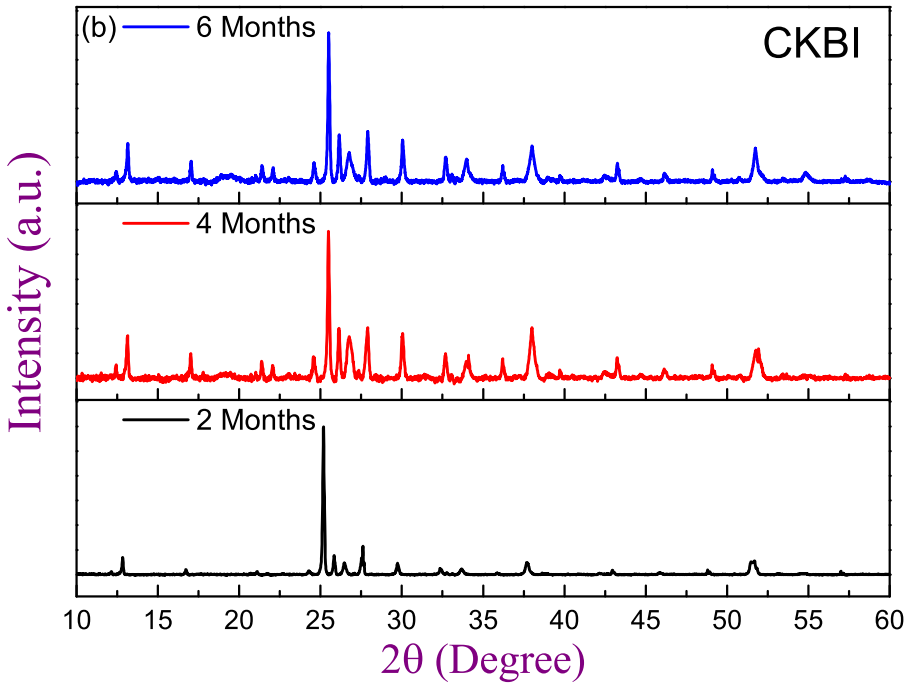


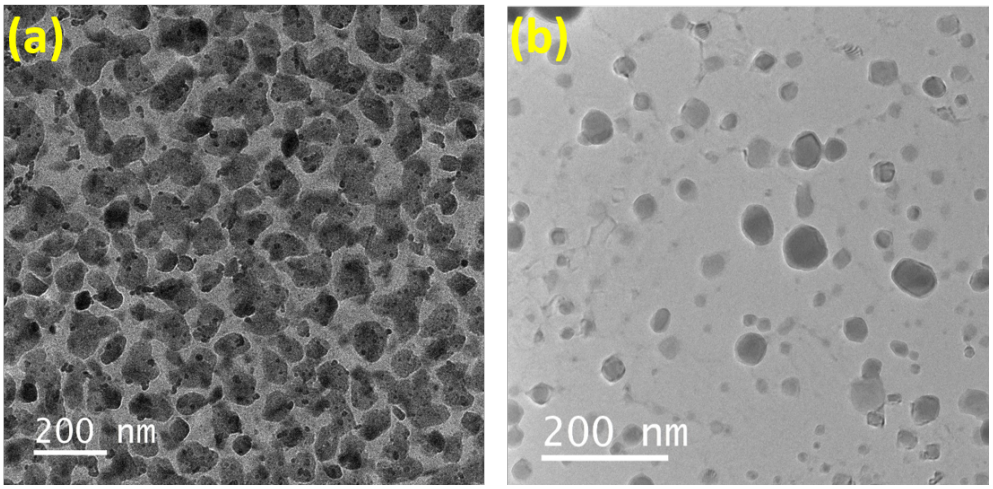
Supplementary Figure 1: (a), (b) FESEM micrographs of CNBI and CKBI perovskite films.



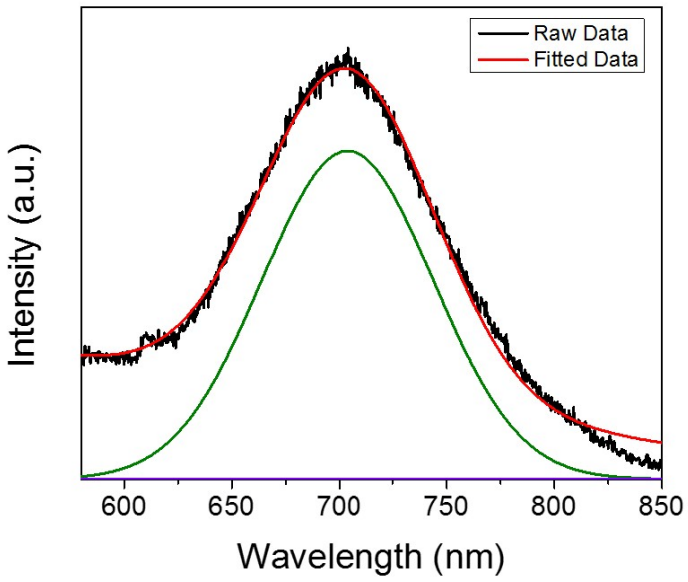
Supplementary Figure 2: Time-dependent XRD patterns of CNBI film.



Supplementary Figure 3: Time-dependent XRD patterns of CKBI film.



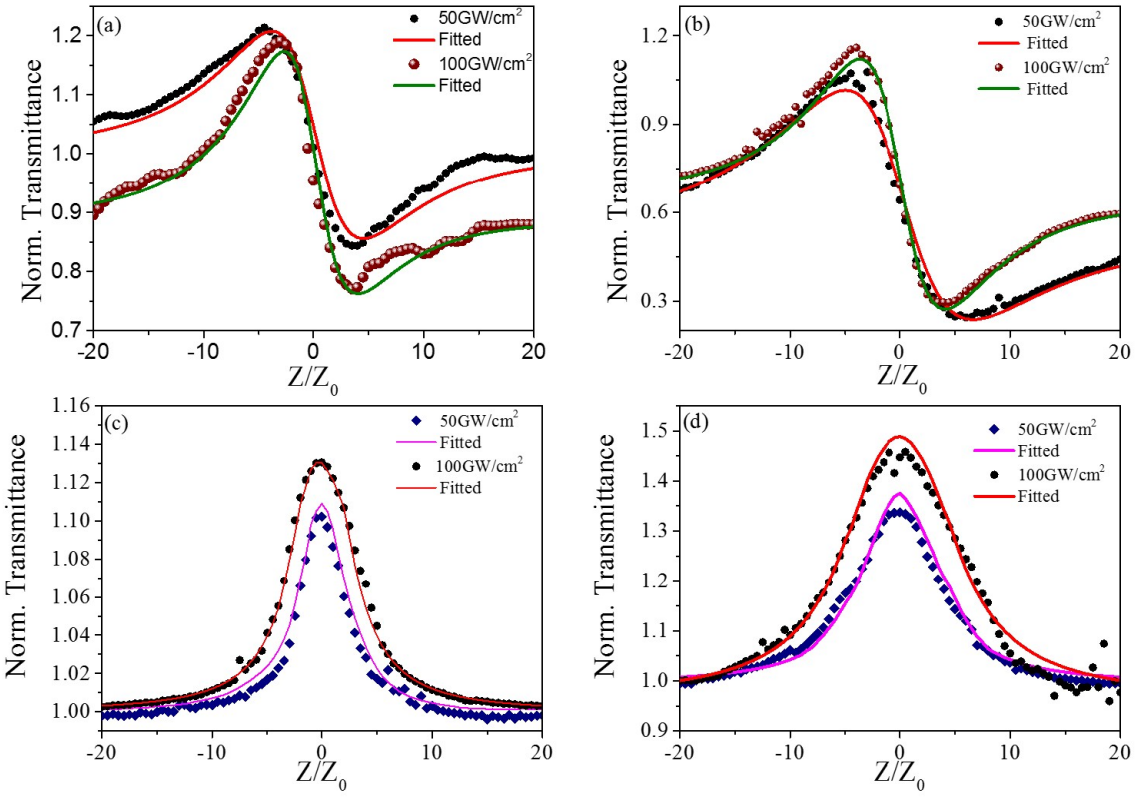
Supplementary Figure 4: (a, b) Transmission electron microscope (TEM) images of CNBI and CKBI samples, respectively.



Supplementary Figure 5: Room temperature PL spectrum recorded from FTO coated glass substrate.

Table 1: **Summary of NLO parameters of CNBI & CKBI perovskites at two different pump powers:**

Sample	Pump power (GW/cm^2)	n_2 (cm^2W^{-1})	β (cm W^{-1})
Cs_2NaBiI_6	50	-0.97±0.051 $\times10^{-14}$	-6.08±2.44$\times10^{-12}$
Cs_2NaBiI_6	100	-1.02±0.069 $\times10^{-14}$	-6.21±1.06$\times10^{-12}$
Cs_2KBiI_6	50	-1.01±0.18$\times10^{-14}$	-1.022±0.14$\times10^{-12}$
Cs_2KBiI_6	100	-1.27±0.26$\times10^{-14}$	-1.16±0.29$\times10^{-12}$



Supplementary Figure 6: (a) and (c) Z-scan traces of CNBI film recorded in CA and OA configurations, respectively. Similarly, traces of CKBI film recorded in CA and OA configurations are plotted in panels (b) and (d) (recorded at different pump powers), respectively.

References

(1) C. Zhang, L. Gao, S. Teo, Z. Guo, Z. Xu, S. Zhao, and T. Ma, Sustainable Energy Fuels, **2018**, 2, 2419.

(2) P. Cheng, T. Wu, Y. Li, L. Jiang, W. Deng, K. Han, et al., New J. Chem.,**2017**, 41, 9598.