Electronic Supplementary Information

Simultaneously achieving room-temperature circularly polarized luminescence and high stability in chiral perovskite nanocrystals via block copolymer micellar nanoreactors

Minju Kim[a], Jiweon Kim[a], Jieun Bang[a], Yu Jin Jang[b], JaeHong Park[a,c], and Dong Ha Kim[a,c,d]*

a. Department of Chemistry and Nano Science, Division of Molecular and Life Sciences, College of Natural Sciences, Ewha Womans University, 52, Ewhayeodae-gil, Seodaemun-gu, Seoul 03760, Republic of Korea

b. Research Center for Energy and Environmental Sciences, Sungkyunkwan University (SKKU), 2066 Seobu-ro, Jangan-gu, Suwon, Gyeonggi-do 16419, Republic of Korea

c. Nanobio·Energy Materials Center (National Research Facilities and Equipment Center), Ewha Womans University, 52, Ewhayeodae-gil, Seodaemun-gu, Seoul 03760, Republic of Korea

d. Basic Sciences Research Institute (Priority Research Institute), Ewha Womans University, 52, Ewhayeodae-gil, Seodaemun-gu, Seoul 03760, Republic of Korea

*Corresponding author: Dong Ha Kim

E-mail address: dhkim@ewha.ac.kr

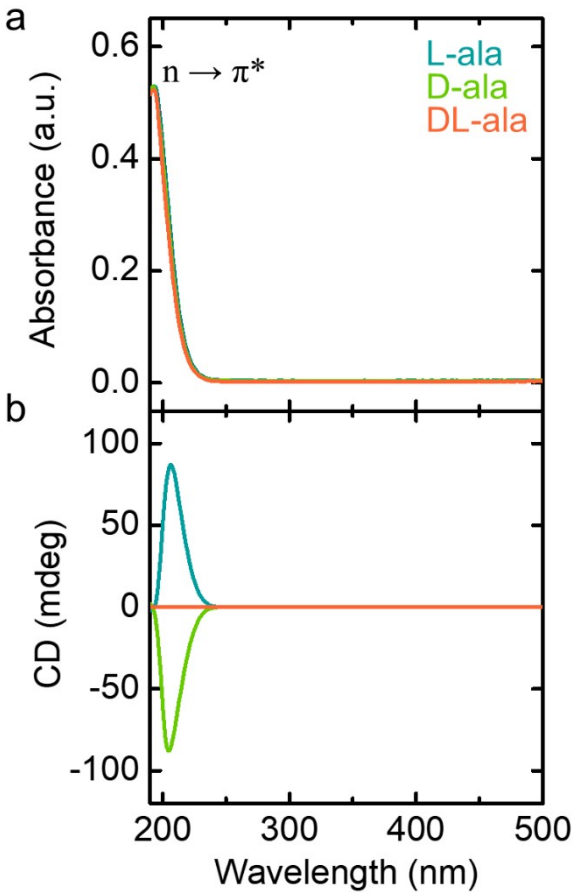

Figure S1. (a) Absorbance and (b) CD spectra of *L*-, *D*-, or *DL*-ala dissolved in deionized water. The absorption peak at 206 nm is attributed to the *n*–*π** transition of the carboxyl acid group in the alanine.

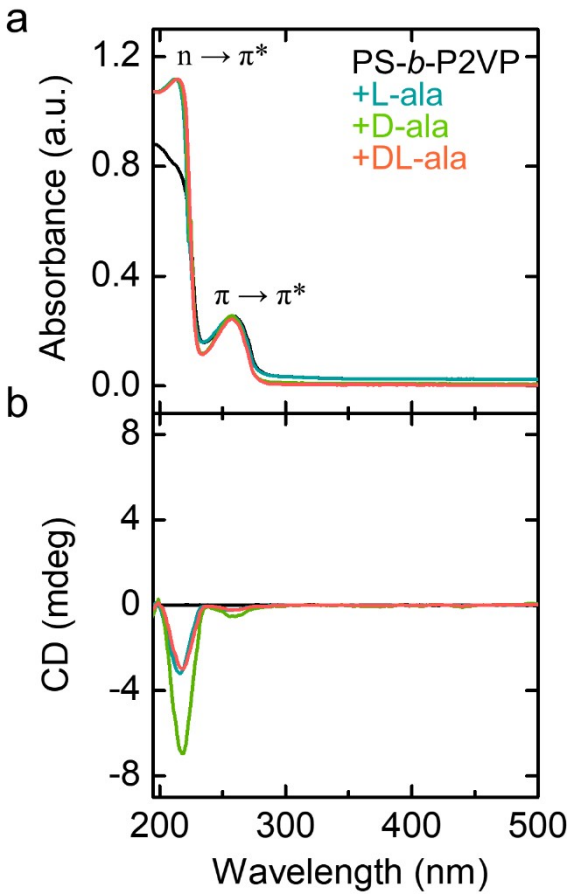

Figure S2. (a) Absorbance and (b) CD spectra of PS-*b*-P2VP complexed with *L*-, *D*-, or *DL*-ala in isopropyl alcohol. The two absorption peaks at 215 and 260 nm correspond to the *n*–*π** and *π*–*π** transitions of the pyridine group, respectively. The solutions were filtered through PTFE filters (0.45 μm) to remove remaining free alanine molecules.

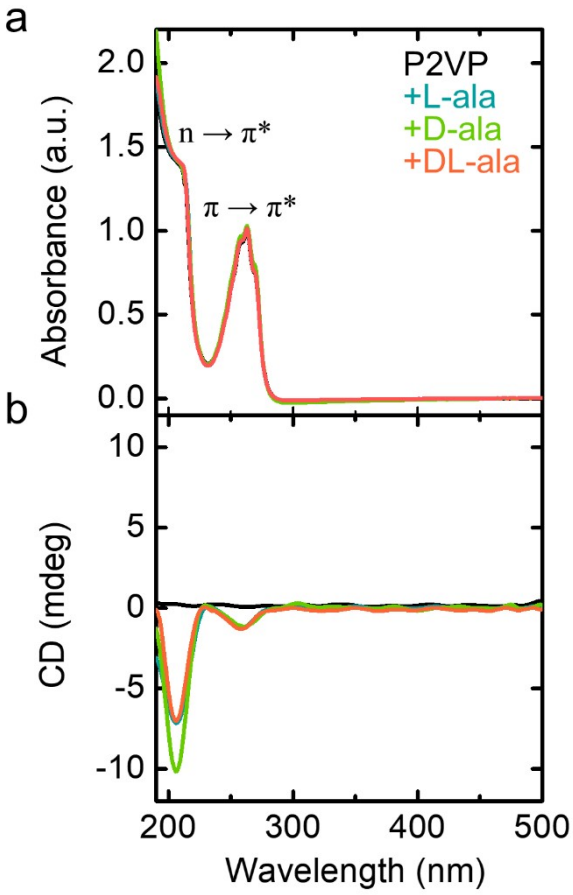

Figure S3. (a) Absorbance and (b) CD spectra of P2VP complexed with *L*-, *D*-, or *DL*-ala in isopropyl alcohol. The two absorption peaks of 207 and 259 nm correspond to the *n*–*π** and *π*–*π** transitions of the pyridine group, respectively. The solutions were filtered through PTFE filters (0.45 μm) to eliminate remaining free alanine molecules.

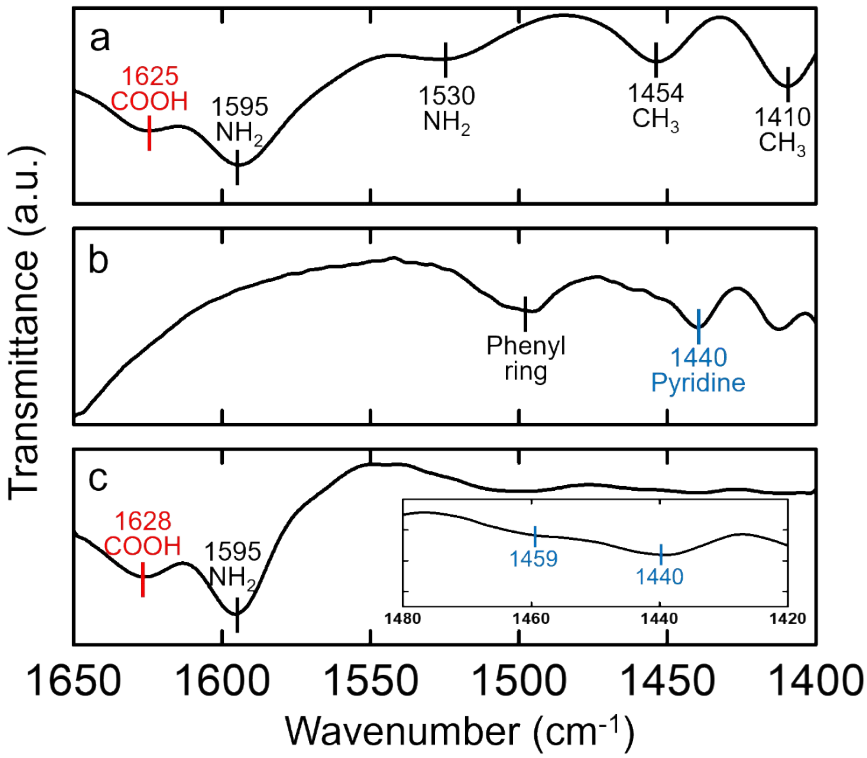

Figure S4. FTIR spectra of (a) *DL*-ala, (b) PS-*b*-P2VP, and (c) PS-*b*-P2VP/*DL*-ala (Inset: magnified spectrum in the range of 1520 cm^{-1}-1400 cm^{-1}).

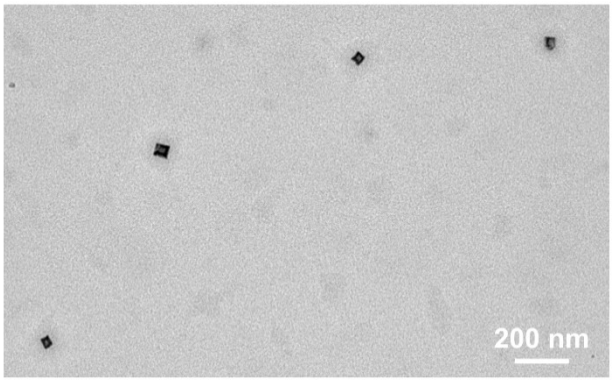

Figure S5. TEM image of the PS-*b*-P2VP inverse micelle-encapsulated $MAPbBr_3$ NCs prepared without *DL*-ala (average size: 20 nm).

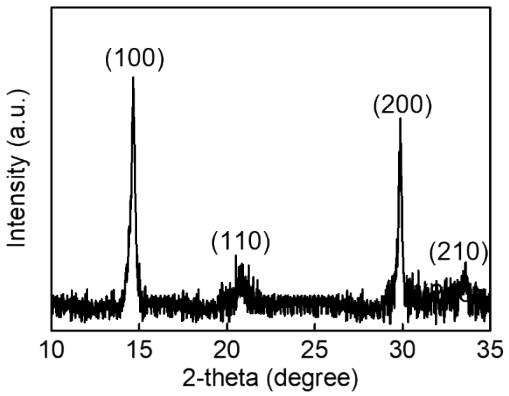

Figure S6. XRD pattern of the PS-*b*-P2VP inverse micelle-encapsulated $MAPbBr_3$ NCs prepared without *DL*-ala.

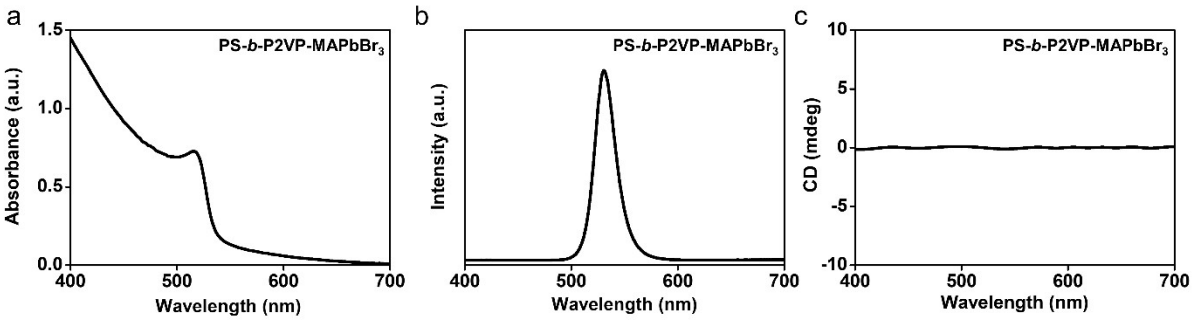

Figure S7. (a) Absorption, (b) PL, and (c) CD spectra of the PS-*b*-P2VP inverse micelle-encapsulated $MAPbBr_3$ NCs. The PL spectrum was taken under 365 nm ultraviolet irradiation.

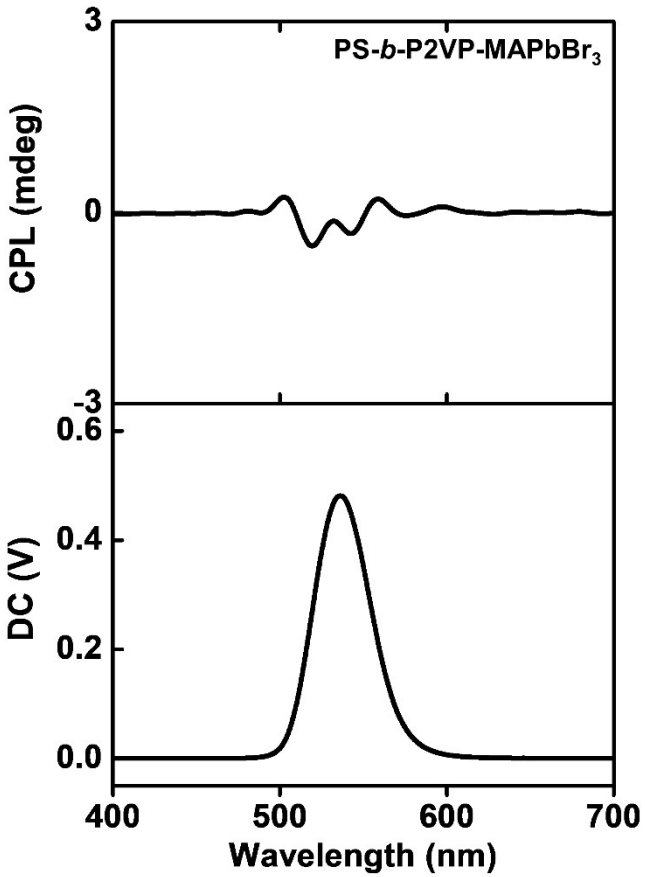

Figure S8. CPL and the corresponding DC spectra of the PS-*b*-P2VP inverse micelle-encapsulated $MAPbBr_3$ NCs. The CPL spectrum was recorded at room temperature under excitation by a 365 nm unpolarized light.

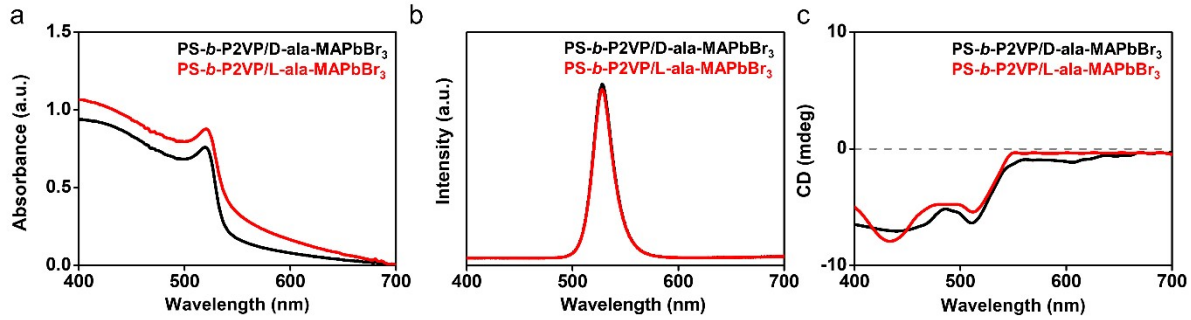

Figure S9. (a) Absorption, (b) PL, and (c) CD spectra of the $MAPbBr_3$ NCs fabricated using PS-*b*-P2VP inverse micelles as nanoreactors and *D*- or *L*-ala as a chiral additive. The PL spectra was recorded under 365 nm ultraviolet irradiation.

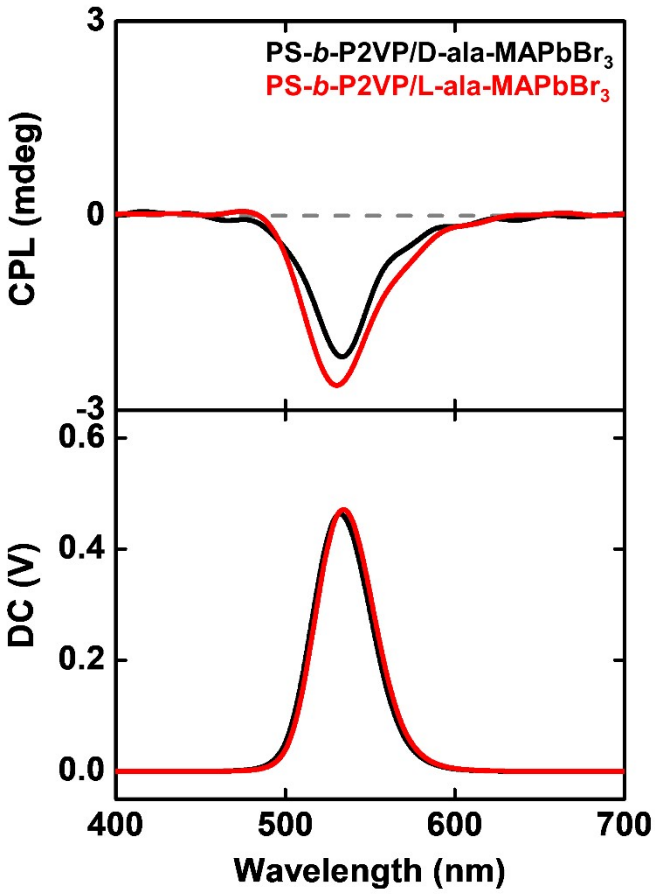

Figure S10. CPL and the corresponding CD spectra of the PS-*b*-P2VP/*D*(or *L*)-ala inverse micelle-encapsulated $MAPbBr_3$ NCs. The CPL spectra were recorded at room temperature under excitation by a 365 nm unpolarized light.

Table S1. PL decay fitting data for PS-*b*-P2VP and the PS-*b*-P2VP/*DL*-ala inverse micelle-encapsulated $MAPbBr_3$ NCs.

$$I(t) = a_1 \exp\left(-\frac{t}{\tau_1}\right) + a_2 \exp\left(-\frac{t}{\tau_2}\right)$$

	PS-*b*-P2VP/$MAPbBr_3$	PS-*b*-P2VP/*DL*-ala/$MAPbBr_3$
a_1	0.601	0.583
τ_1	8.81 ns	7.84 ns
a_2	0.399	0.417
τ_2	38.6 ns	43.3 ns
τ_{avg}†	31.0 ns	36.2 ns

†τ_{avg} was determined by the lifetime-weighted average calculations, $\tau_{avg} = \sum_i a_i \tau_i^2 / \sum_i a_i \tau_i$.

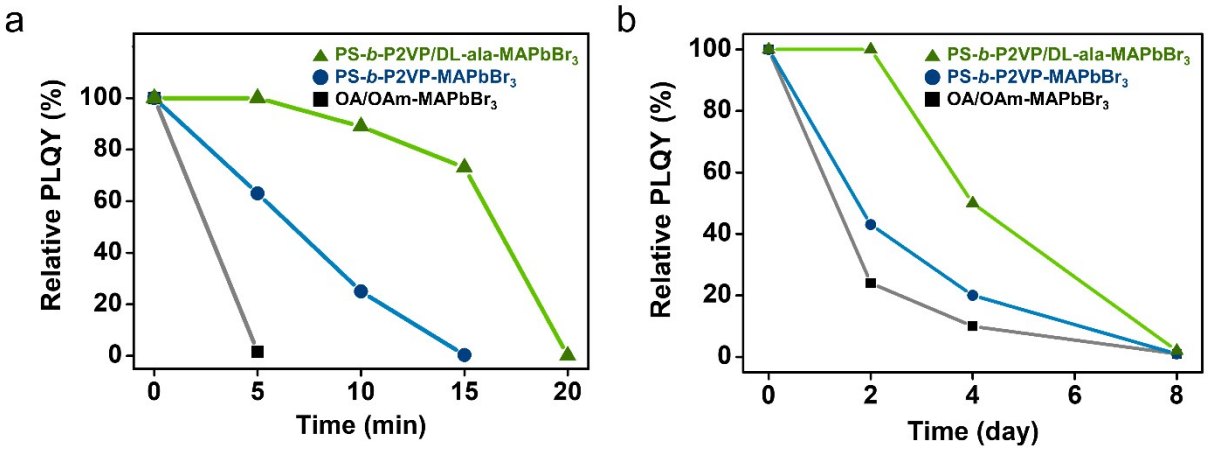

Figure S11. (a) Water and (b) thermal stabilities of the PS-*b*-P2VP/*DL*-ala inverse micelle-encapsulated $MAPbBr_3$ NCs (green). The OA and OAm-cocapped NCs (black) and the PS-*b*-P2VP inverse micelle-encapsulated $MAPbBr_3$ NCs (blue) were used as controls (the purification was not performed).

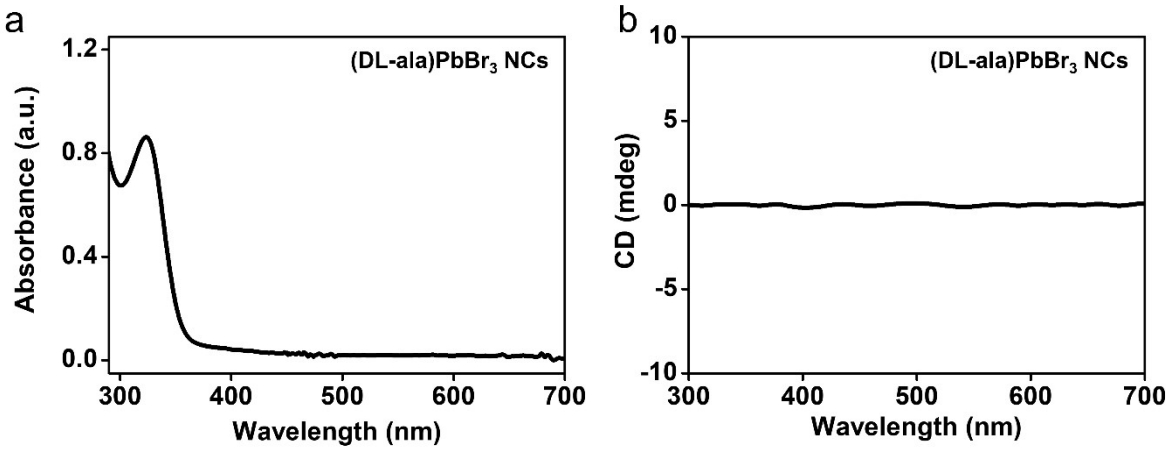

Figure S12. (a) Absorption and (b) CD spectra of the (*DL*-ala)$PbBr_3$ NCs encapsulated by the PS-*b*-P2VP inverse micelles.