Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

$KYb_2F_7:Er^{3+}$ based nanothermometers: Controlled synthesis, enhanced red emission, and improved sensitivities via crystal-site engineering

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Supporting information

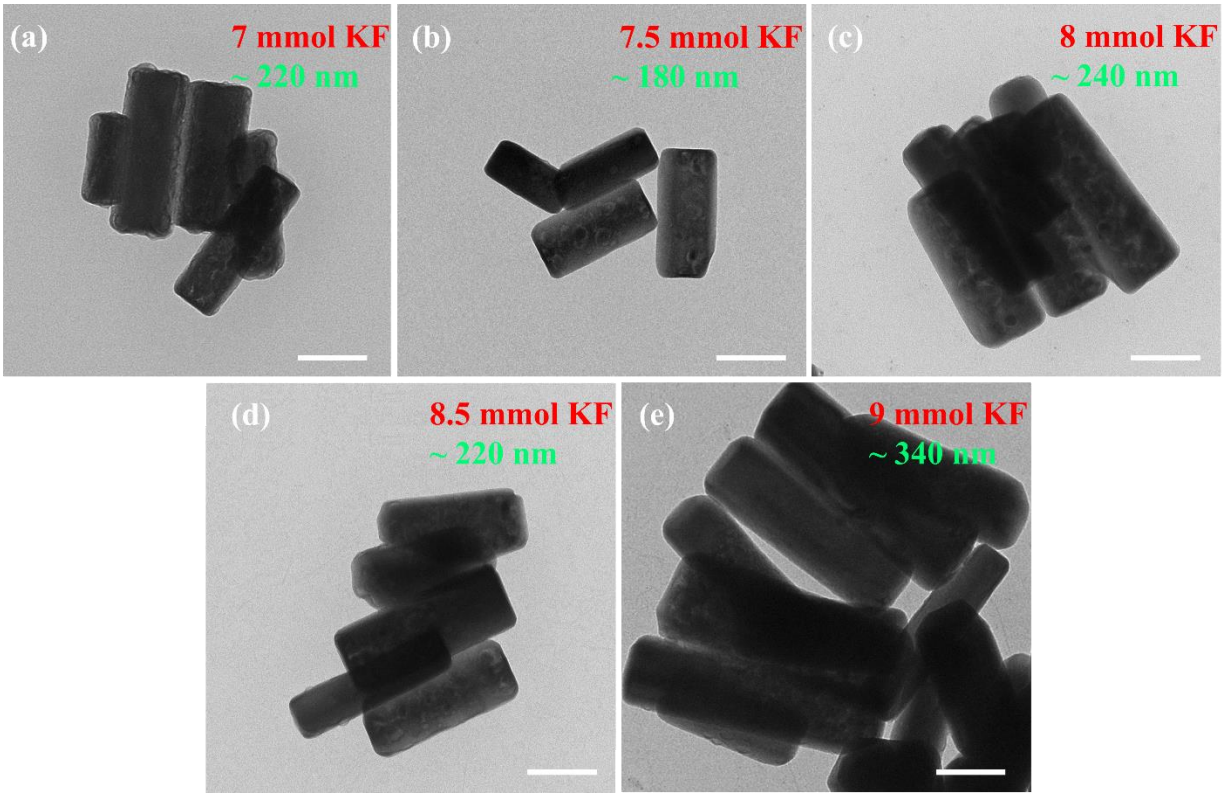

Fig. S1. TEM images of the $KYb_{1.8}Ge_{0.15}F_7:Er^{3+}$ (2 mol%) nanocrystals prepared with different KF dose at (a) 7, (b) 7.5, (c) 8, (d) 8.5, and (e) 9 mmol, respectively. The scale bar is 100 nm.

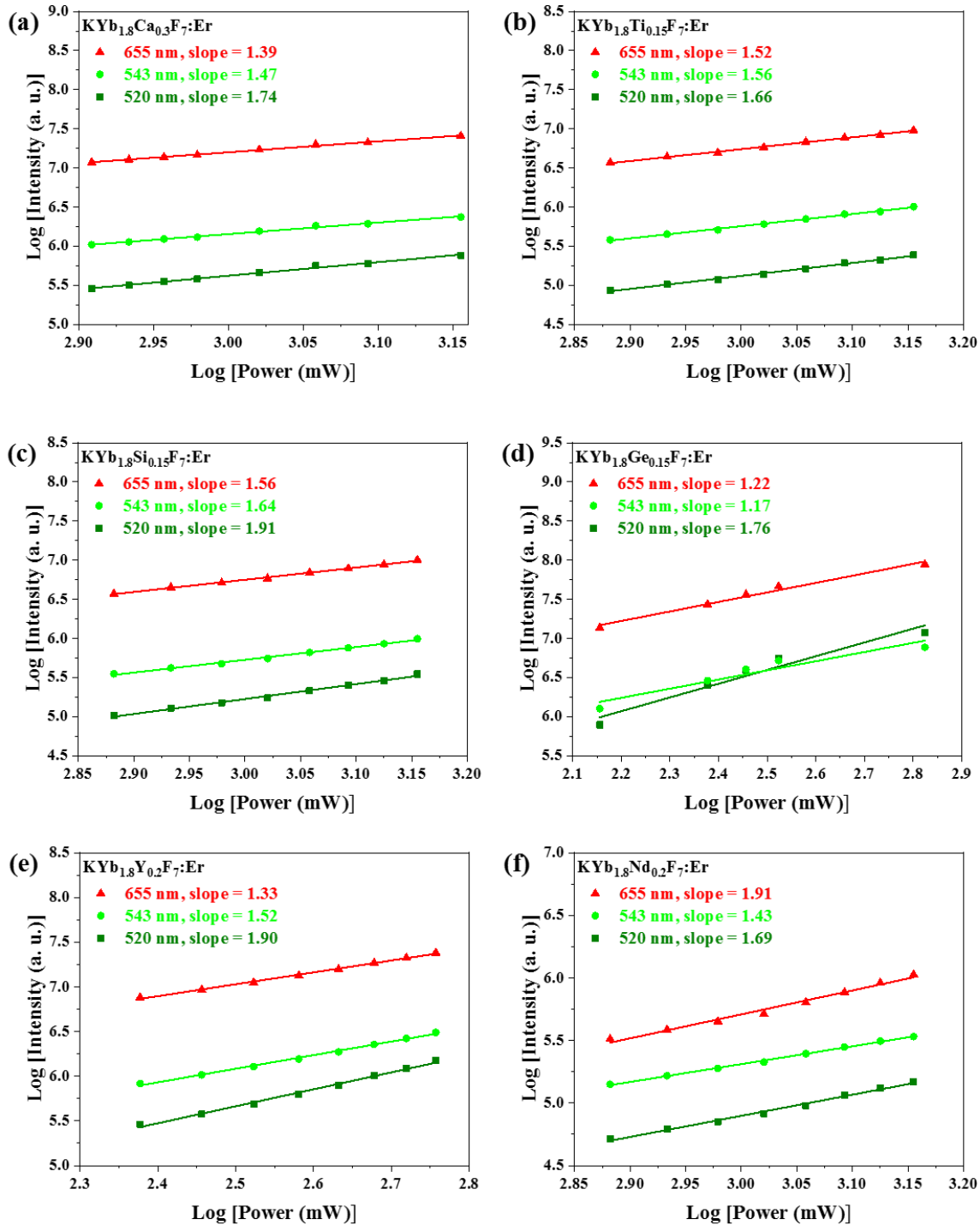

Fig. S2. Log-Log plot of UC green and red emission of the $KYb_{1.8}M_xF_7:Er^{3+}$ (2 mol%) (M = (a) Ca^{2+}, (b) Ti^{4+} , (c) Si^{4+}, (d) Ge^{4+}, (e) Y^{3+}, and (f) Nd^{3+}) nanocrystals under the 980 nm laser excitation.

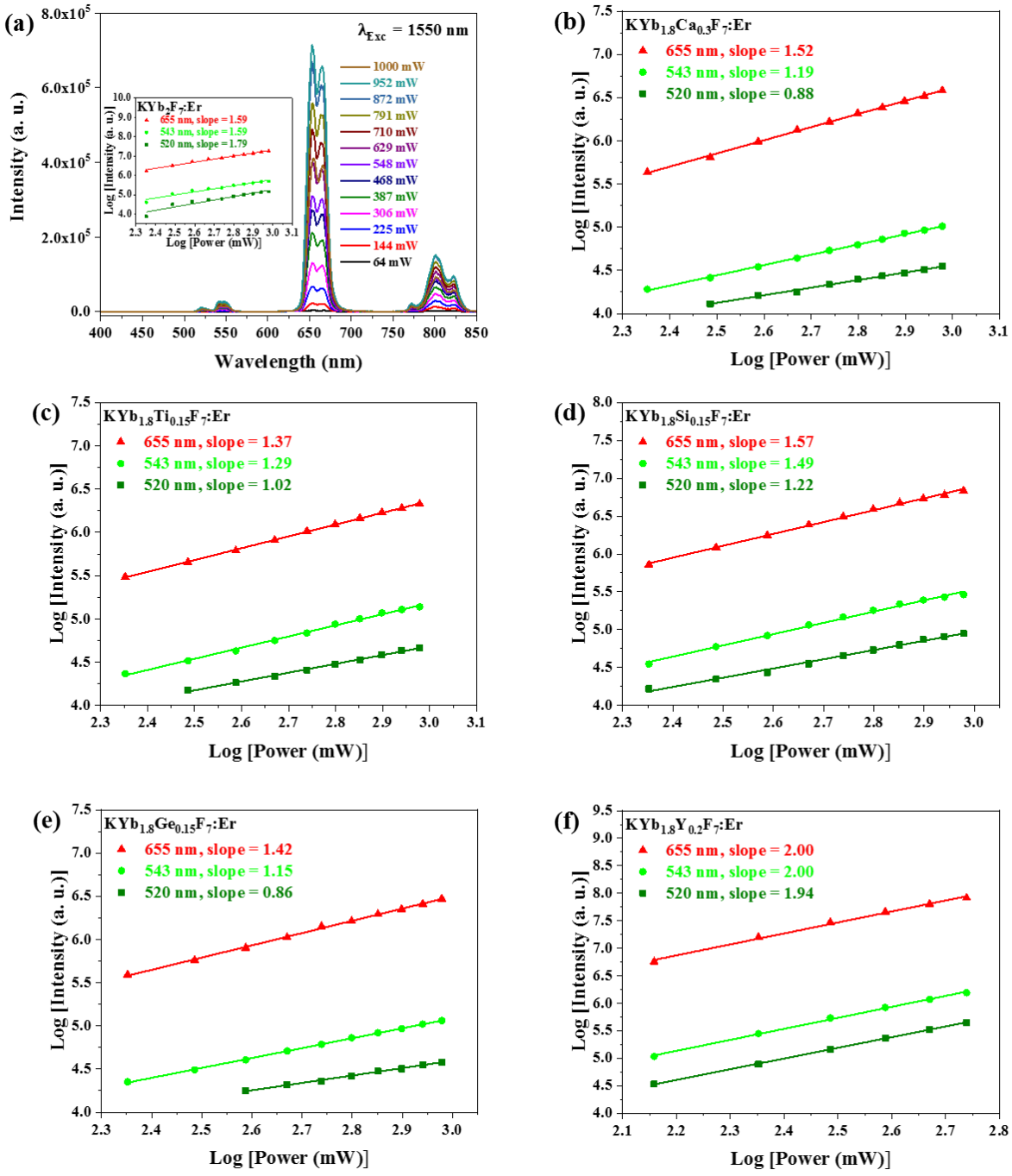

Fig. S3. (a) Pump-power dependent UC emission spectra from Er^{3+} emission at 520, 543, and 655 nm of $KYb_2F_7:Er^{3+}$ (2 mol%) and log-log plot of green and red emission of the $KYb_2F_7:Er^{3+}$ (2 mol%) (inset in a) and $KYb_{1.8}M_xF_7:Er^{3+}$ (2 mol%) (M = (b) Ca^{2+}, (c) Ti^{4+} , (d) Si^{4+}, (e) Ge^{4+}, and (f) Y^{3+} nanocrystals under the 1550 nm laser excitation.

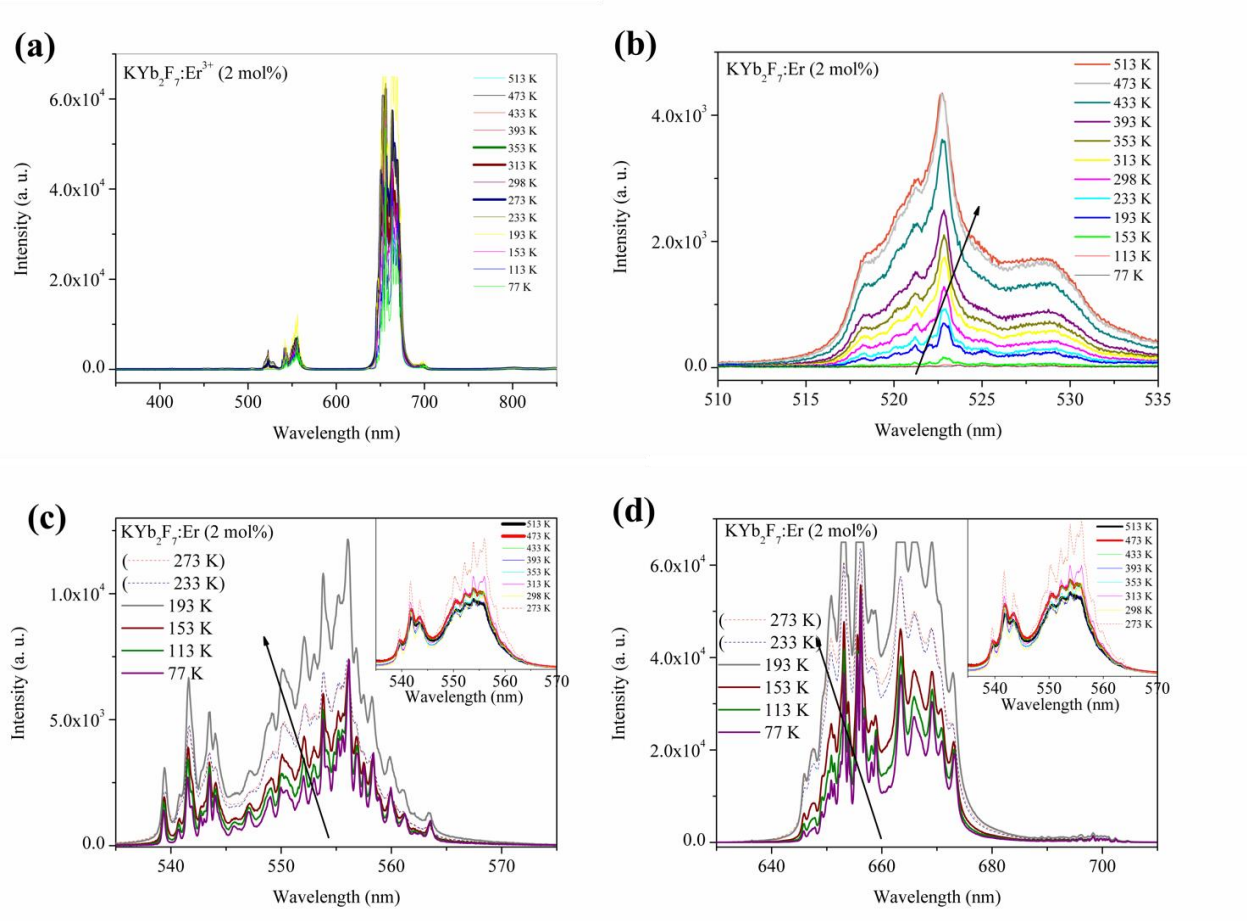

Fig. S4. 77-513 K temperature dependent UC emission spectra of the $KYb_2F_7:Er^{3+}$ (2 mol%) nanocrystals with 980 nm laser excitation.

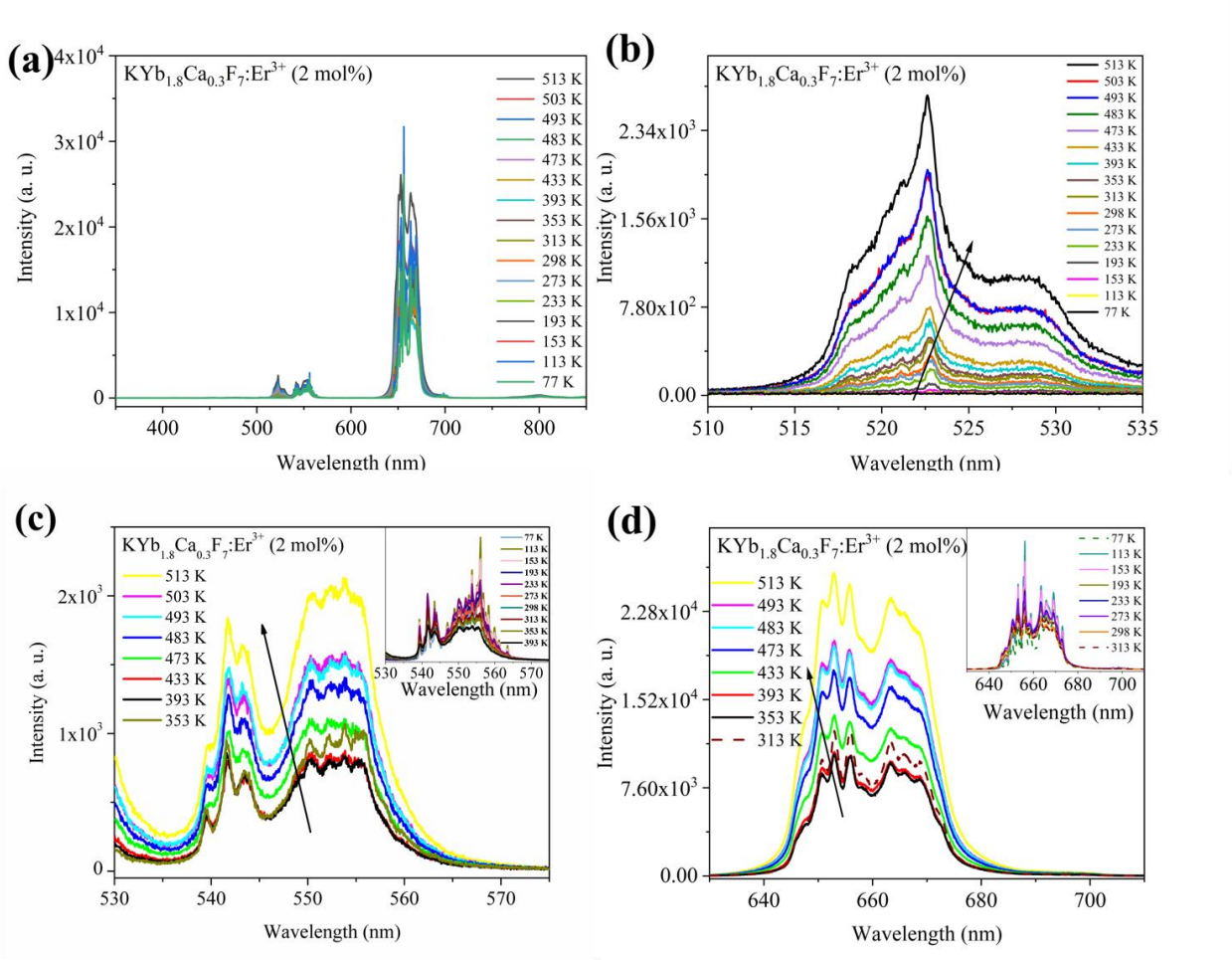

Fig. S5. 77-513 K temperature dependent UC emission spectra of the $KYb_{1.8}Ca_{0.3}F_7:Er^{3+}$ (2 mol%) nanocrystals with 980 nm laser excitation.

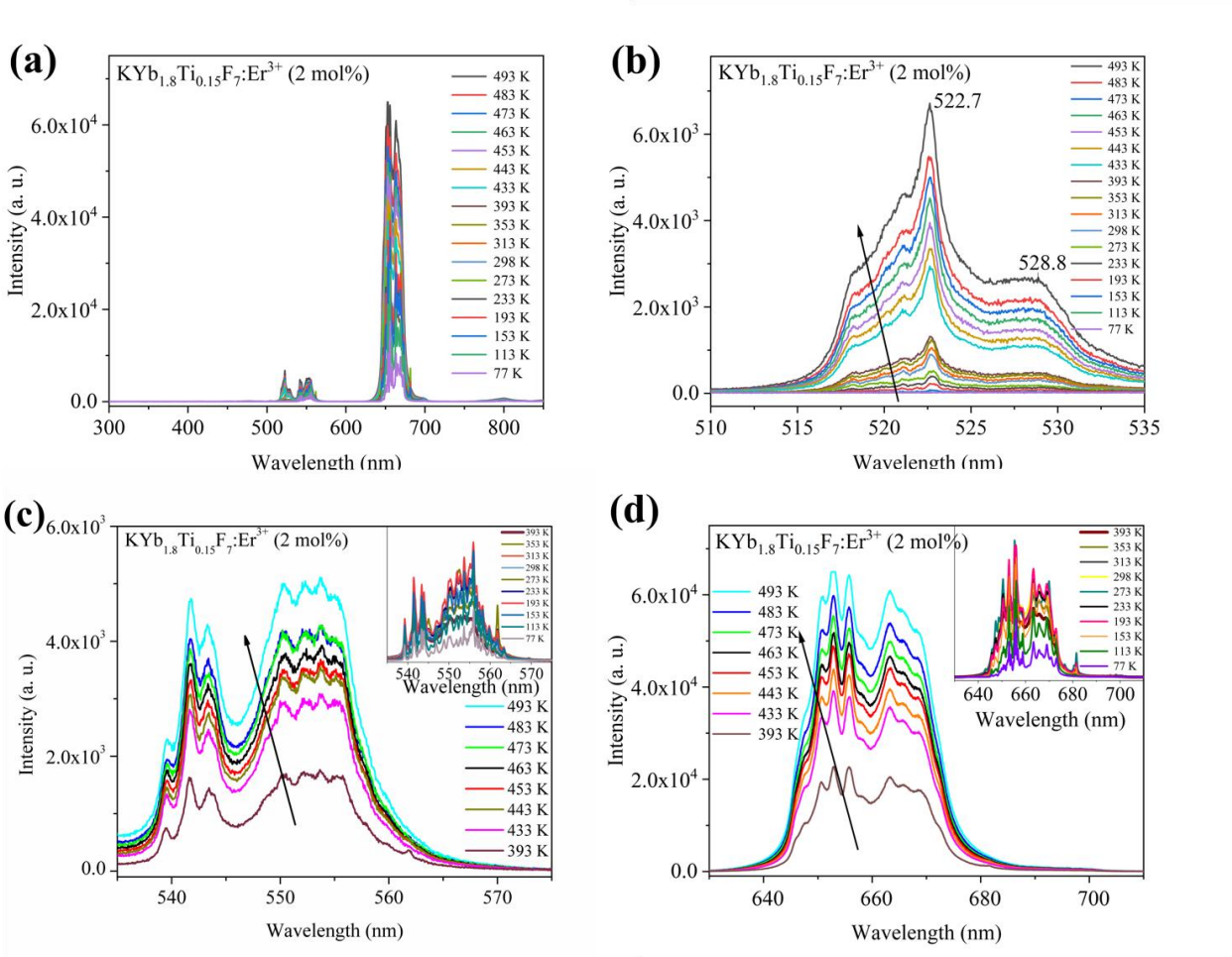

Fig. S6. 77-513 K temperature dependent UC emission spectra of the $KYb_{1.8}Ti_{0.15}F_7:Er^{3+}$ (2 mol%) nanocrystals with 980 nm laser excitation.

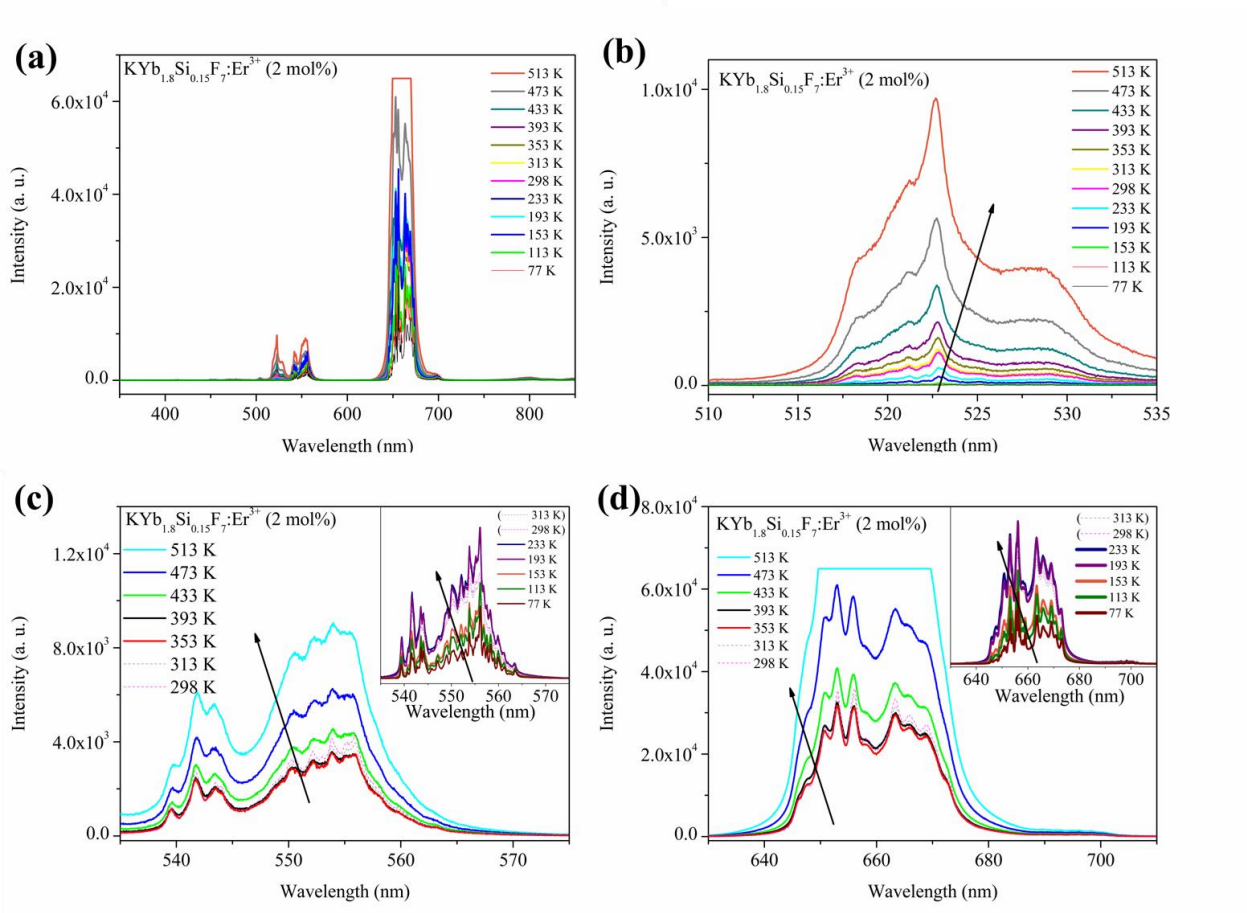

Fig. S7. 77-513 K temperature dependent UC emission spectra of the $KYb_{1.8}Si_{0.15}F_7:Er^{3+}$ (2 mol%) nanocrystals with 980 nm laser excitation.

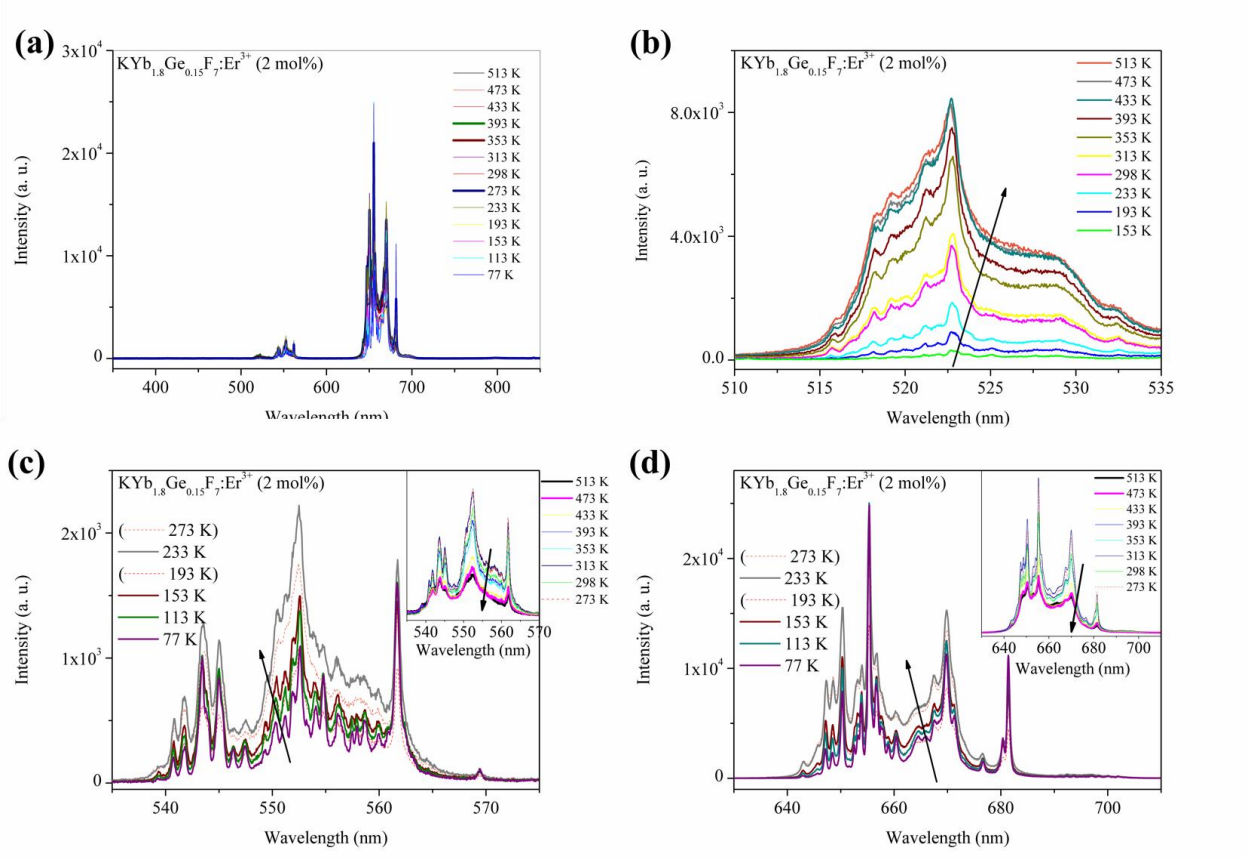

Fig. S8. 77-513 K temperature dependent UC emission spectra of the $KYb_{1.8}Ge_{0.15}F_7:Er^{3+}$ (2 mol%) nanocrystals with 980 nm laser excitation.

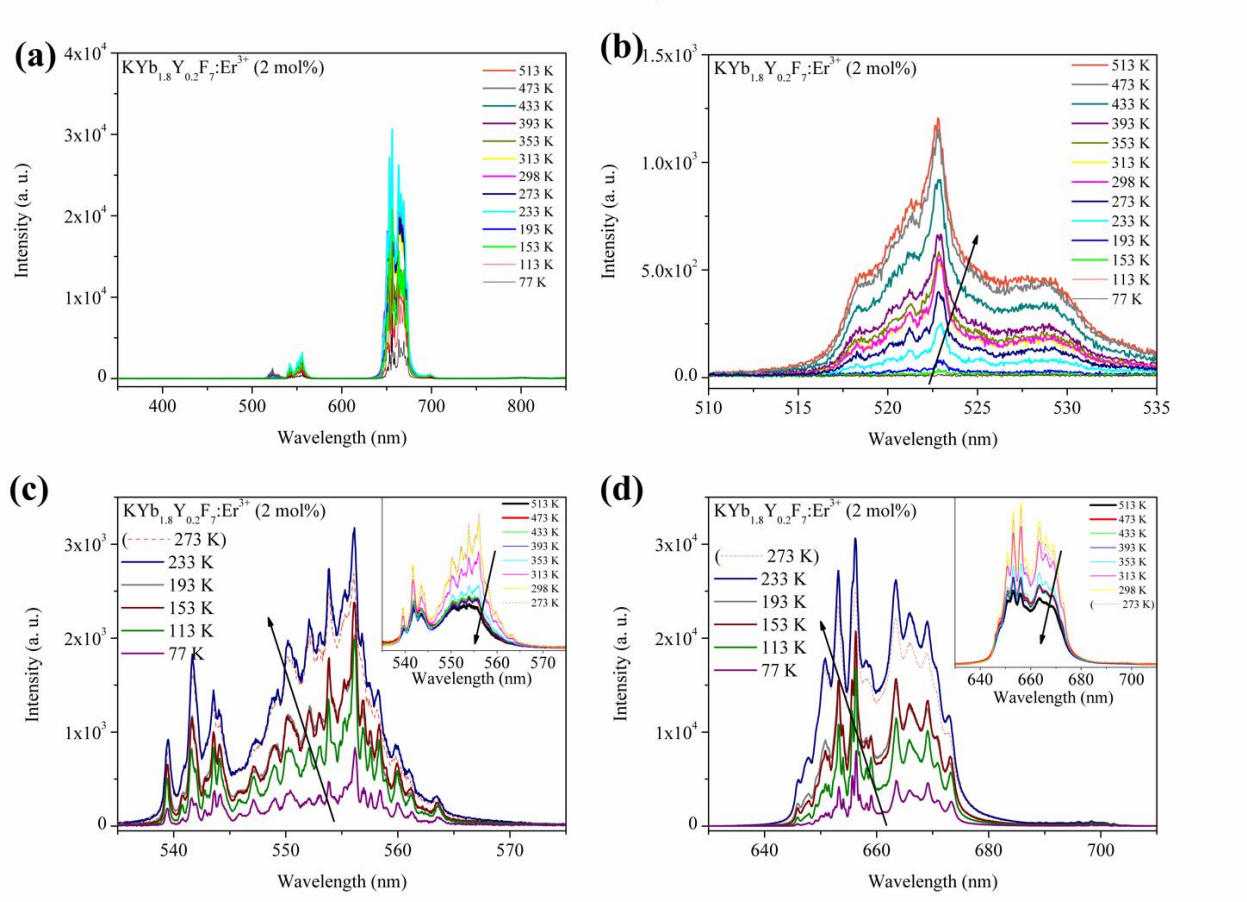

Fig. S9. 77-513 K temperature dependent UC emission spectra of the $KYb_{1.8}Y_{0.2}F_7:Er^{3+}$ (2 mol%) nanocrystals with 980 nm laser excitation.

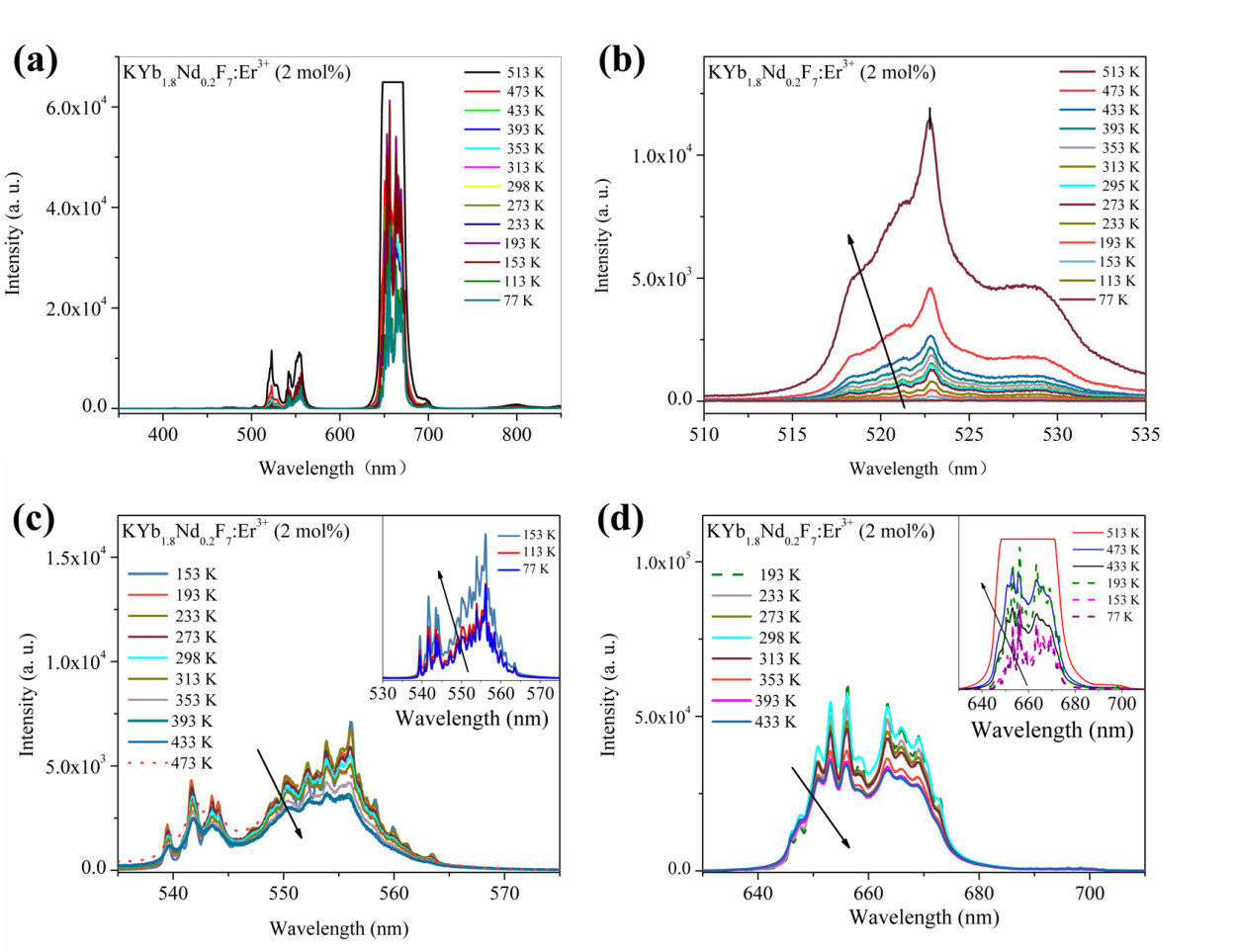

Fig. S10. 77-513 K temperature dependent UC emission spectra of the $KYb_{1.8}Nd_{0.2}F_7:Er^{3+}$ (2 mol%) with 980 nm laser excitation.