Supporting Information

Lead-free perovskite $Rb_2Sn_{1-x}Te_xCl_6$ with bright luminescence for optical thermometry and tunable white light emitting diodes

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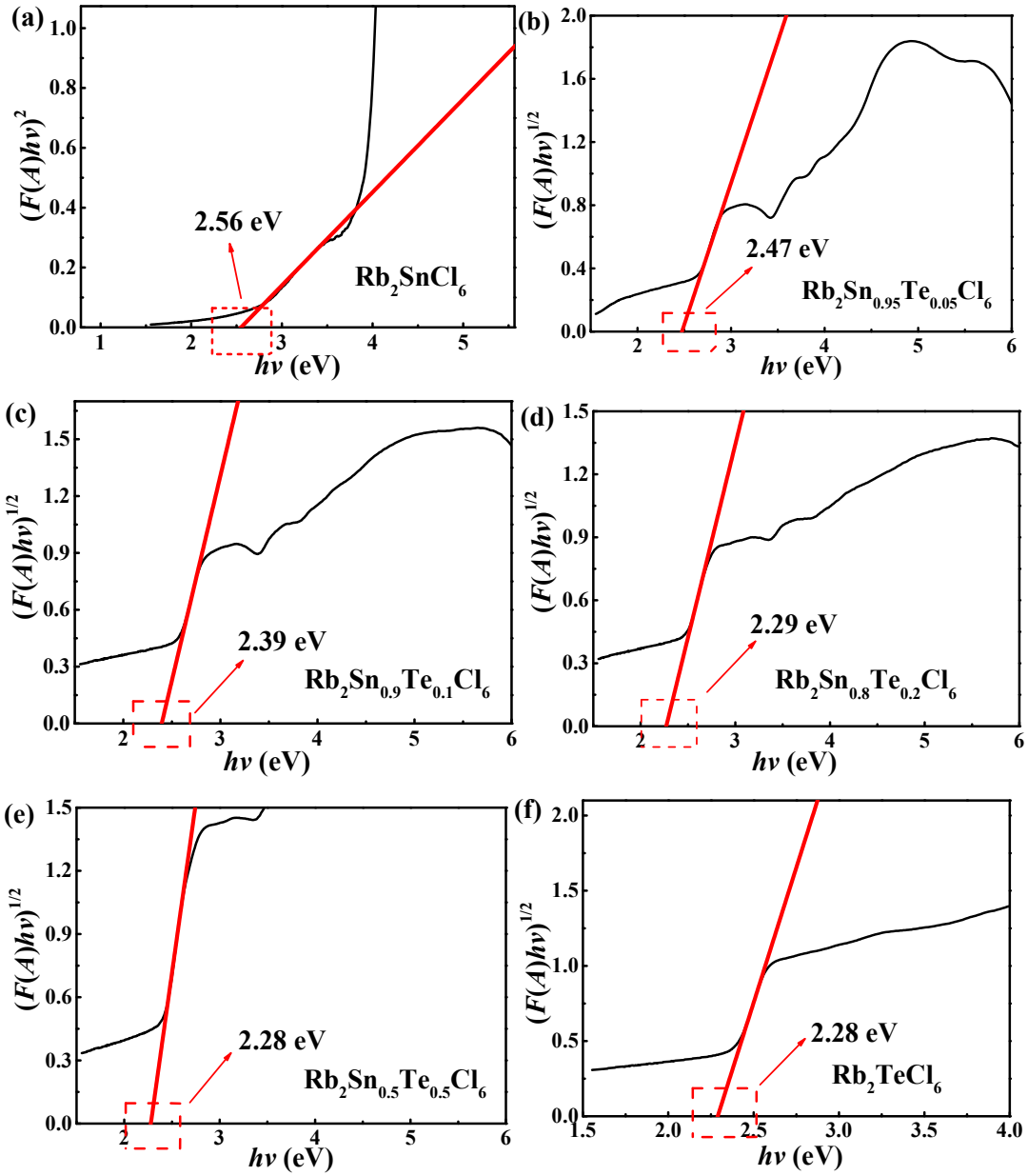


Figure S1 The optical band gap is calculated by the Tauc-plot formula based on the absorption spectra. the band gap obtained of (a) Rb_2SnCl_6 MCs, (b) $Rb_2Sn_{0.95}Te_{0.05}Cl_6$ MCs, (c) $Rb_2Sn_{0.9}Te_{0.1}Cl_6$ MCs, (d) $Rb_2Sn_{0.8}Te_{0.2}Cl_6$ MCs, (e) $Rb_2Sn_{0.5}Te_{0.5}Cl_6$ MCs (f) Rb_2TeCl_6 MCs.

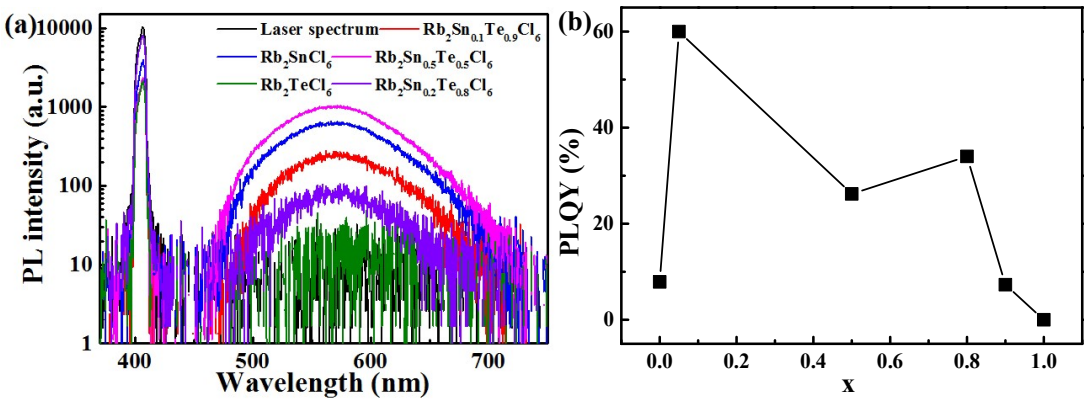


Figure S2 PLQY with x values changing

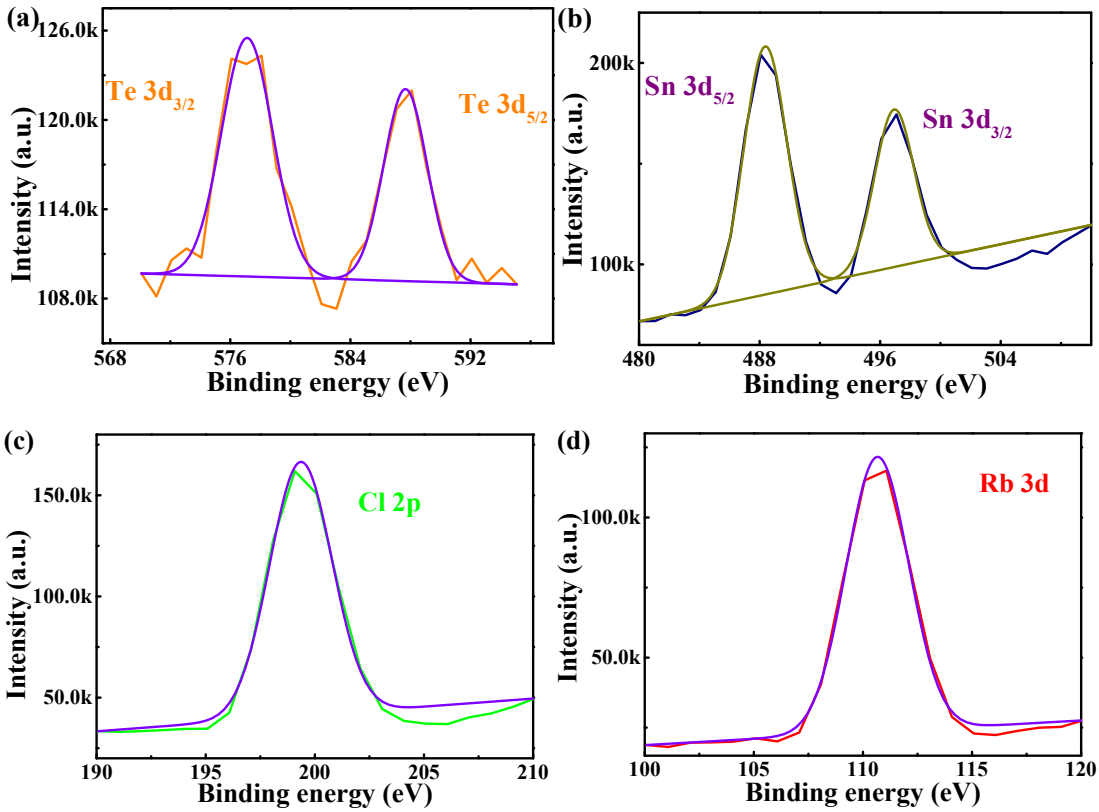
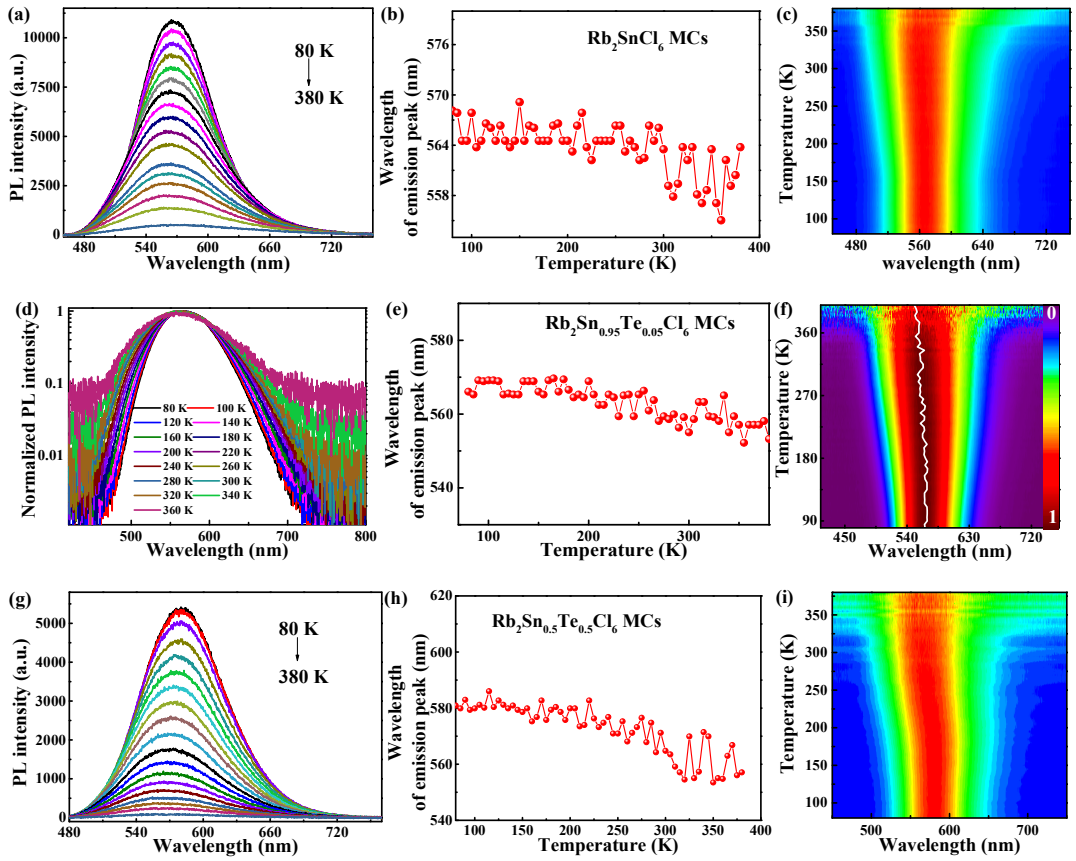


Figure S3 The XPS spectra of (a) Te 3d. (b) Sn 3d. (c) Cl 2p. (d) Rb 3d



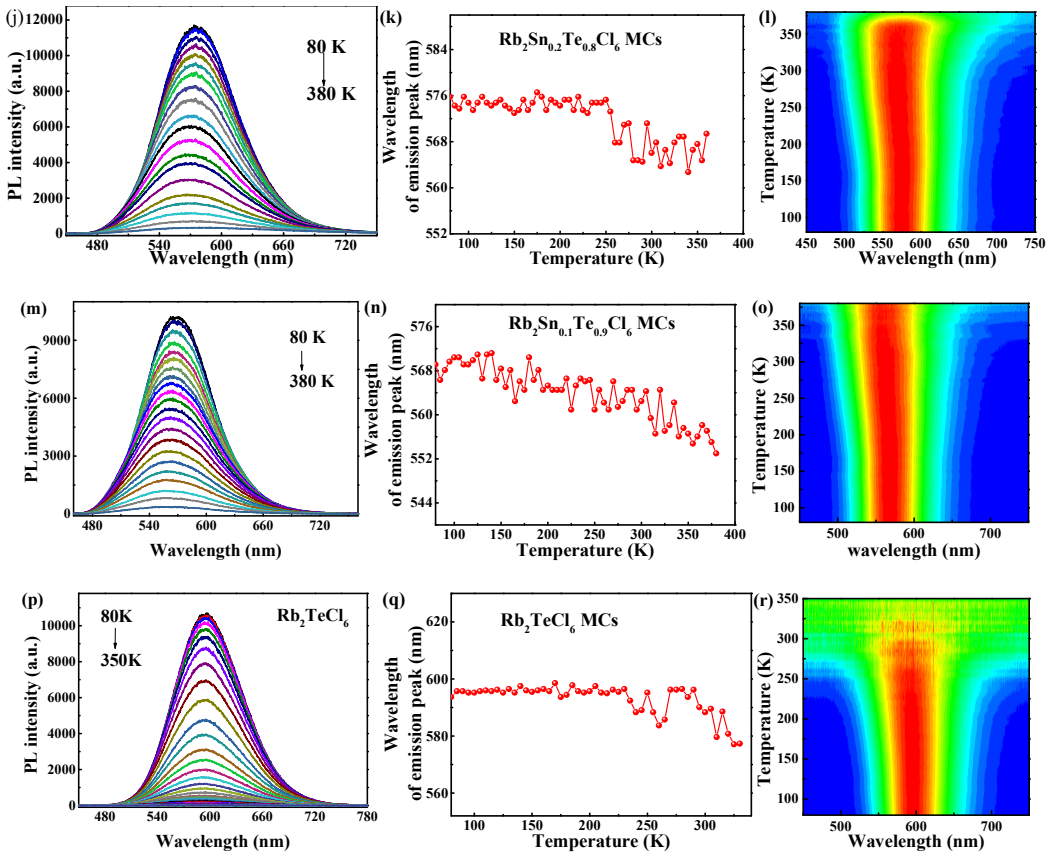
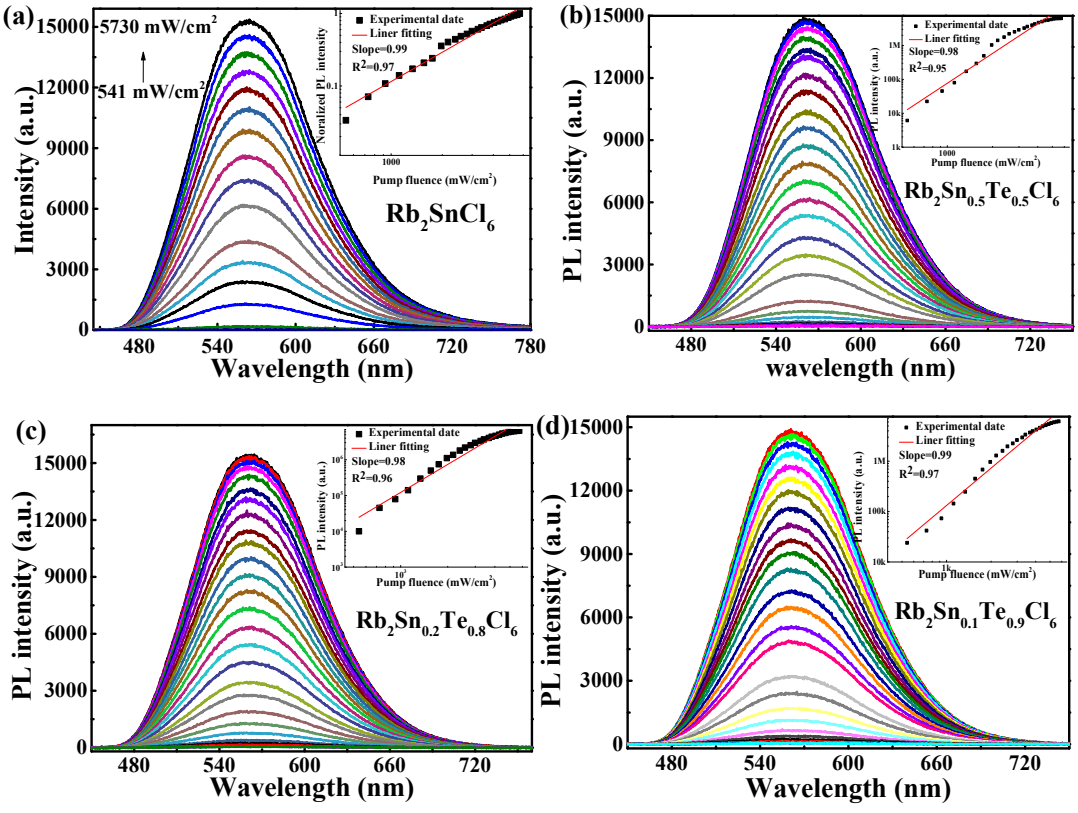


Figure S4 PL spectra, temperature dependence of emission peak wavelength and The normalized PL pseudocolor map of (a-c) Rb_2SnCl_6, (d-f) $Rb_2Sn_{0.95}Te_{0.05}Cl_6$, (g-i) $Rb_2Sn_{0.5}Te_{0.5}Cl_6$ (j-l) $Rb_2Sn_{0.2}Te_{0.8}Cl_6$ (m-o) $Rb_2Sn_{0.1}Te_{0.9}Cl_6$ (p-r) Rb_2TeCl_6 MCs at 80-380 K.



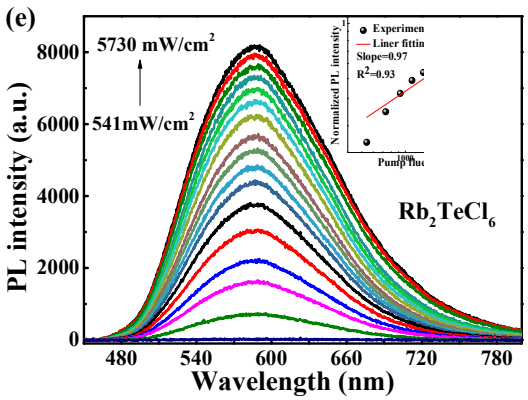


Figure S5 PL spectra of (a)Rb_2SnCl_6 (b)$Rb_2Sn_{0.1}Te_{0.9}Cl_6$ (c)$Rb_2Sn_{0.2}Te_{0.8}Cl_6$ (d)$Rb_2Sn_{0.5}Te_{0.5}Cl_6$ (e)Rb_2TeCl_6 MCs at 405 nm CW laser at different pump fluence under 80 K, and the insets are the linear fitting between PL intensity and pump fluence

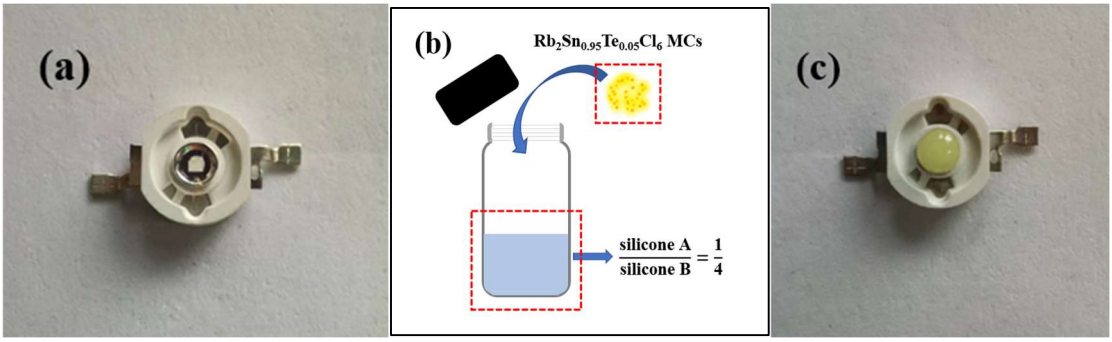


Figure S6 (a) The LED chip without coating $Rb_2Sn_{0.95}Te_{0.05}Cl_6$ MCs (b) The way prepares the mixture of the light-transmitting encapsulating silica gel A and the light-shading encapsulating silica gel B and $Rb_2Sn_{0.95}Te_{0.05}Cl_6$. (c) The LED chip with coating $Rb_2Sn_{0.95}Te_{0.05}Cl_6$ MCs.