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Supporting Information

Tuning of thermal quenching performance of Bi^{3+}-doped scheelite $Ca(Mo/W)O_4$ solid solution phosphors

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Figure S1

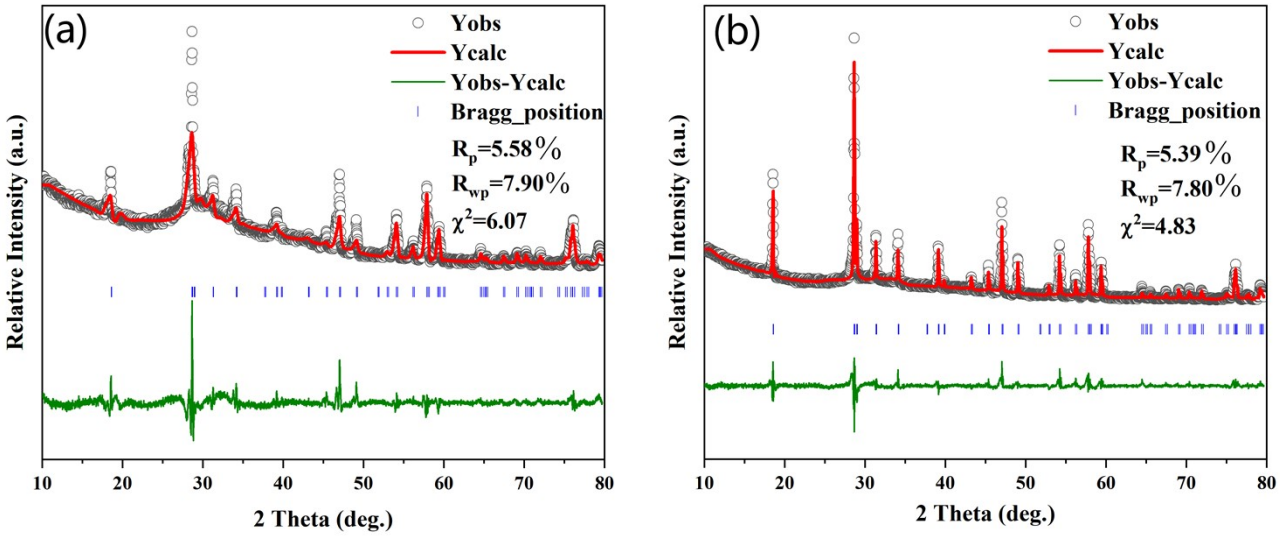

Figure S1 Rietveld refinement patterns for X-ray diffraction patterns of (a)$Ca0_{.99}Mo_{0.5}W_{0.5}O_4$:0.01$Bi^{3+}$ (b)$Ca_{0.99}WO_4$:0.01Bi^{3+}.

Figure S2

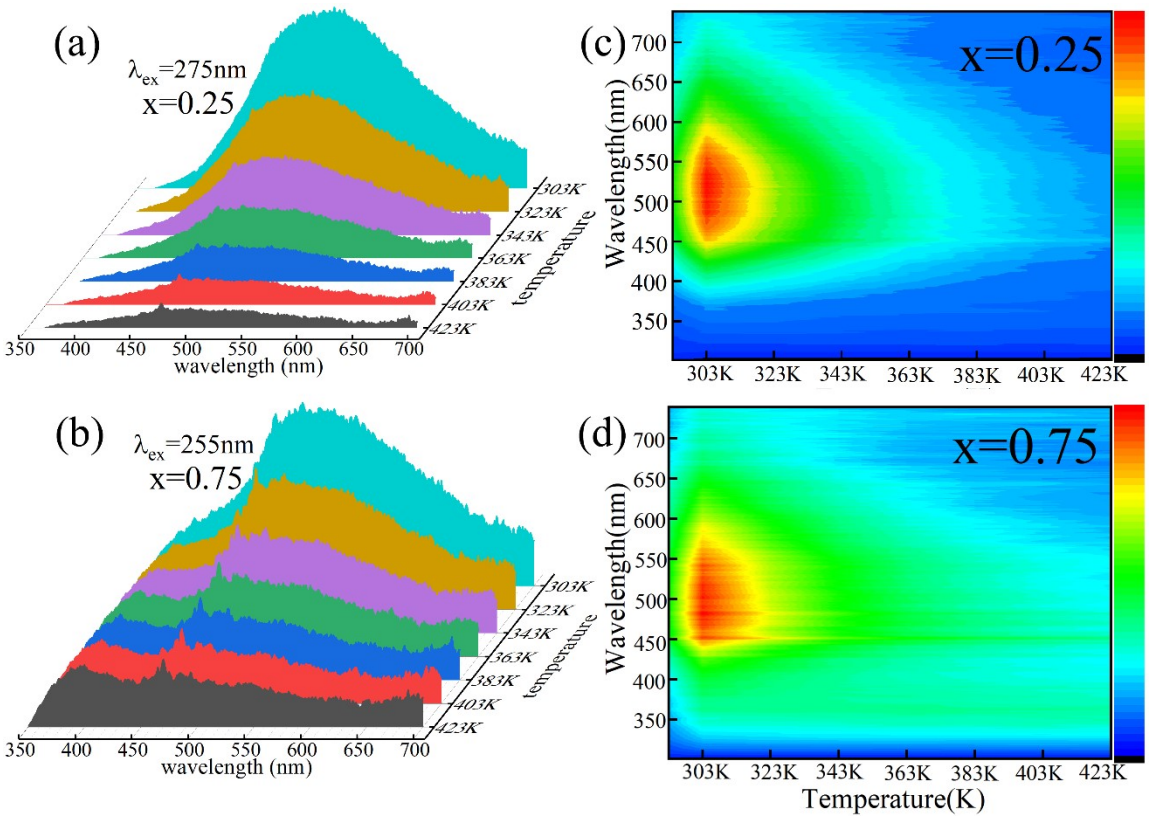

Figure S2 Emission spectra of (a, c) $Ca_{0.99}Mo_{0.75}W_{0.25}O_4$:0.01$Bi^{3+}$ (b, d) $Ca_{0.99}Mo_{0.25}W_{0.75}O_4$:0.01$Bi^{3+}$ at 303-423K.

Figure S3

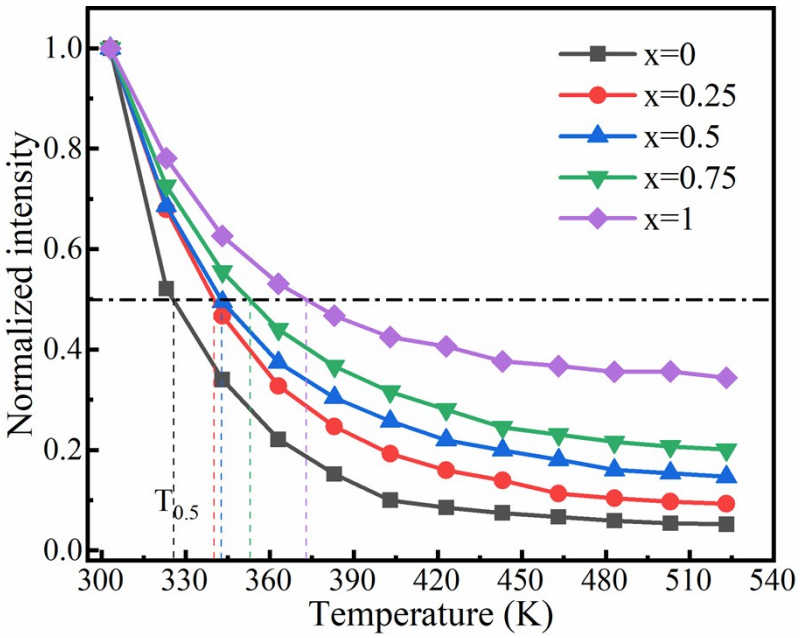

Figure S3 Normalized integrated intensity of $Ca_{0.99}Mo_{1-x}WxO_4$:0.01Bi^{3+} (x=0-1) at 303-523K

Figure S4

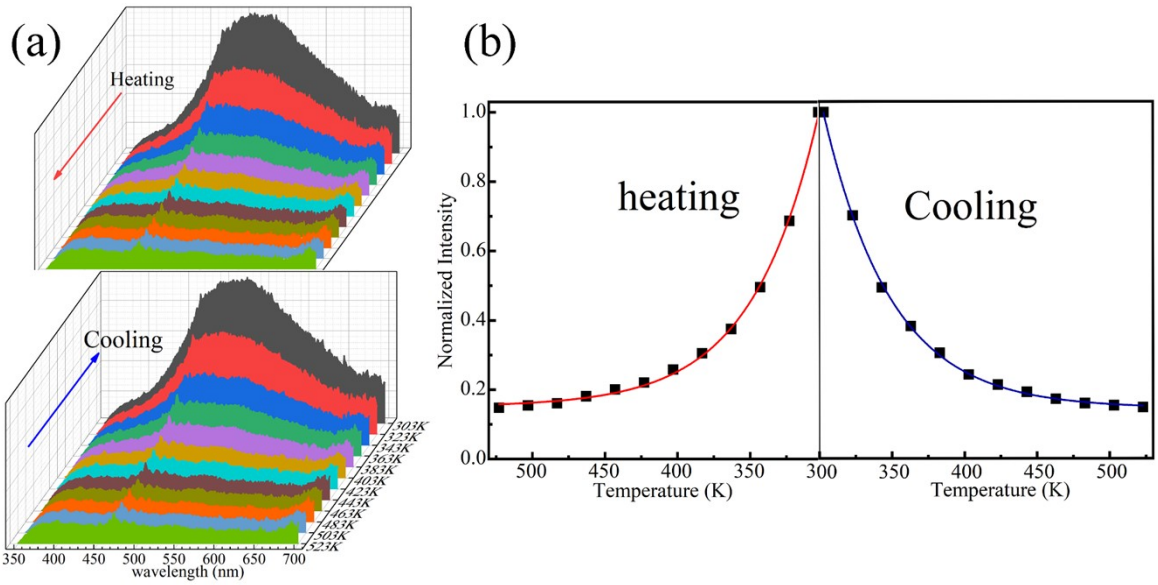

Fig. S4 (a) Emission spectra of $Ca_{0.99}Mo_{0.5}W_{0.5}O_4$:0.01$Bi^{3+}$ solid solution on heating and cooling at 303-523K. (b) The fitting curve of the corresponding integrated intensity.

Figure S5

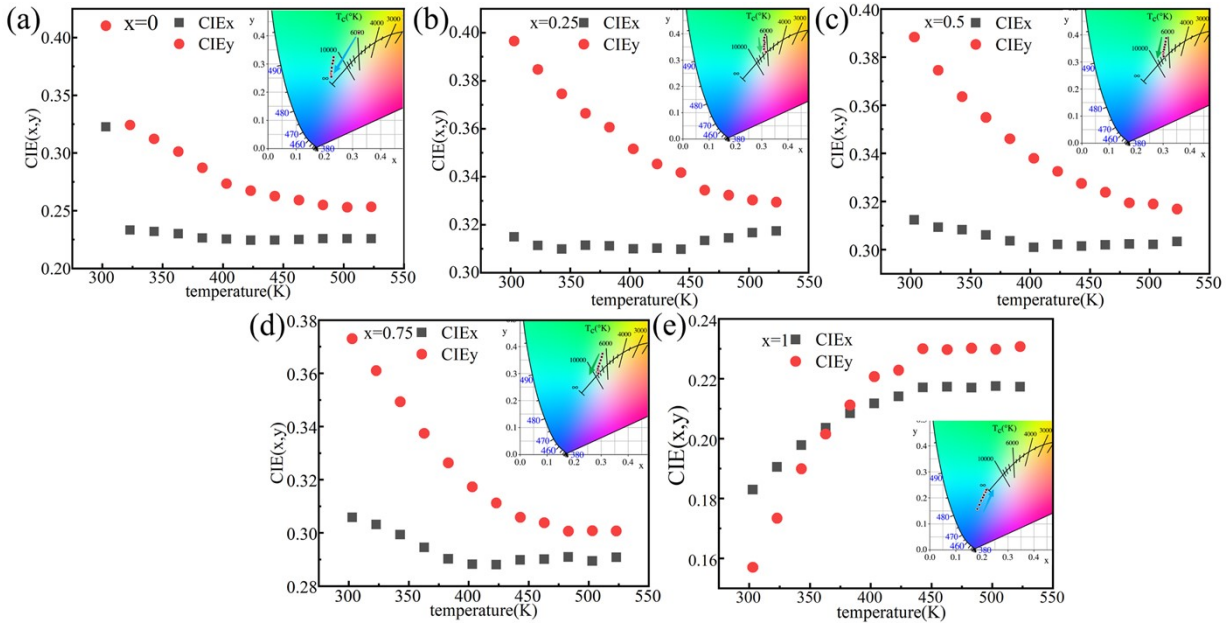

Figure S5 (a-e) $Ca_{0.99}Mo_{1-x}W_xO_4$:0.01Bi^{3+} (x=0, 0.25, 0.5, 0.75, 1) in variable temperature chromaticity coordinates (x, y), and the insets are the corresponding CIE chromaticity diagrams.

Figure S6

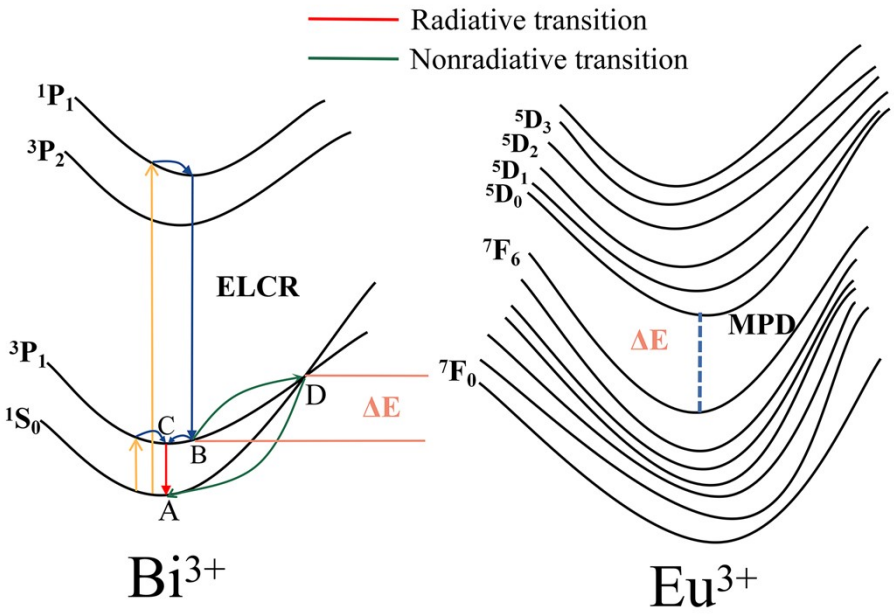

Figure S6 Schematic of the quenching mechanism for the Bi^{3+} activator and the MPD quenching for Eu^{3+}.

Figure S7

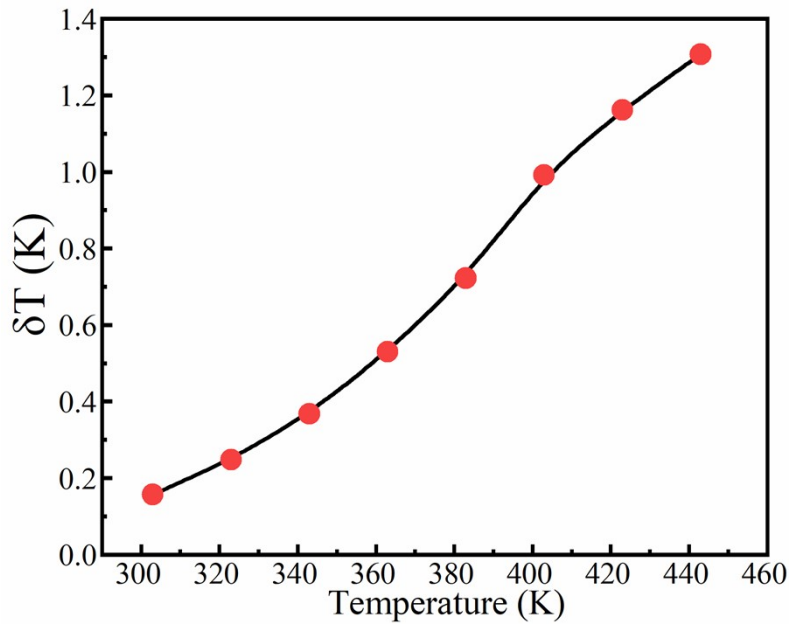

Figure S7 The temperature resolution of $Ca_{0.985}Mo_{0.5}W_{0.5}O_4$:0.01$Bi^{3+}$,0.0025$Eu^{3+}$.

Table S1 The relevant Rietveld refinement parameters and crystallo-graphic data.

Parameter	$Ca_{0.99}MoO_4:0.01Bi^{3+}$	$Ca_{0.99}Mo_{0.5}W_{0.5}O_4:0.01Bi^{3+}$	$Ca_{0.99}WO_4:0.01Bi^{3+}$
Space group	$I4_1/a$	$I4_1/a$	$I4_1/a$
a=b (Å)	5.22294	5.24020	5.24801
c (Å)	11.43149	11.42373	11.38946
α=β=γ (deg)	90.000	90.000	90.000
Unit cell volume ($Å^3$)	311.841	313.692	313.684
R_p (%)	4.99	5.58	5.39
R_{wp} (%)	6.79	6.70	7.80
χ^2	3.77	6.07	4.83

Table S2 Several dual rare-earth doped optical temperature measurement materials of Sa and Sr for typical temperature sensors.

Sensing materials	Excitation wavelength(nm)	Temperature range(K)	S_r(%K^{-1})	Sa (K^{-1})	Ref.
SrY_2O_4:Bi^{3+},Eu^{3+}	330	313-563	0.86	0.0433	1
$CaYZr_2Al_3O_{12}$:Bi^{3+},Eu^{3+}	278	297-573	0.664	0.00826	2
$LaScO_3$:Bi^{3+},Eu^{3+}	308	280-480	0.795	0.118	3
$NaGd(MoO_4)_2$:Tb^{3+},Pr^{3+}	310	303-483	2.05	0.097	4
$LuNbO_4$: Tb^{3+},Pr^{3+}	305	283-493	1.26	0.024	5
$NaGdF_4$:Yb^{3+},Er^{3+}	980	303-343	1.29	0.0365	6
$GdNbO_4$:Bi^{3+},Eu^{3+}	308	303-523	3.81	0.0367	7
$Ca_{0.985}Mo_{0.5}W_{0.5}O_4$:$Bi^{3+}$,$Eu^{3+}$	265	303-523	3.1713	0.06553	This work

Reference

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