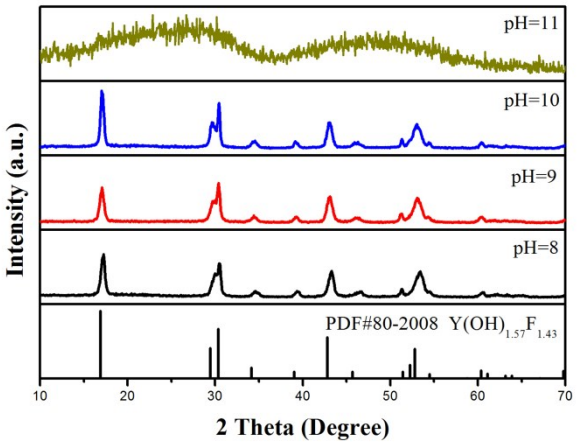

Fig. S1 XRD patterns of as-prepared $Y(OH)_{1.57}F_{1.43}$ under the different pH value.

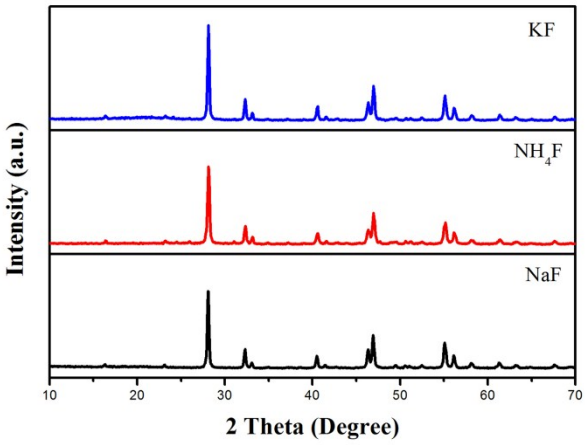

Fig. S2 XRD patterns of V-YOF with different F^- sources.

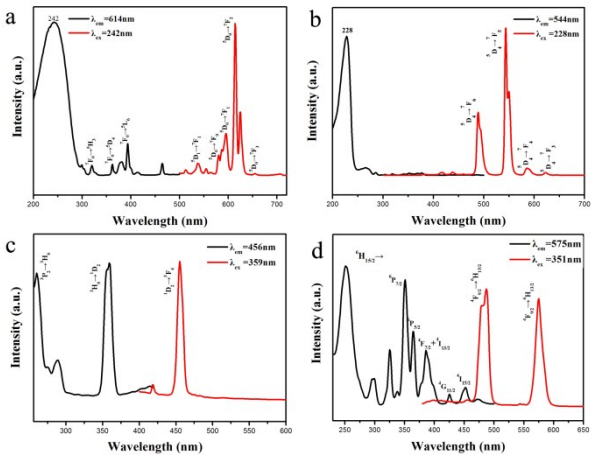

Fig. S3 PLE and PL spectra of V-YOF:0.05Eu3+ (a), V-YOF:0.05Tb3+ (b), V-YOF:0.05Tm3+ (c), V-YOF:0.05Dy3+ (d).

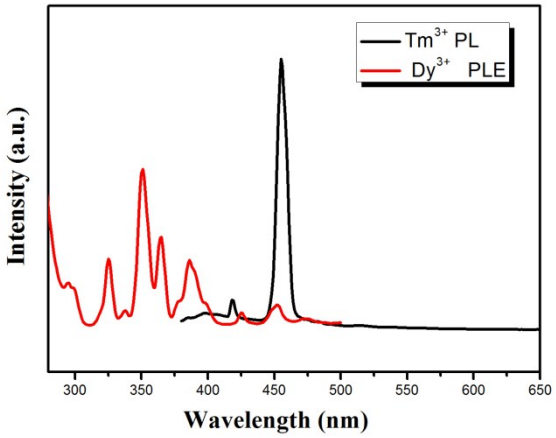

Figure. S4 PL excitation spectra of V-YOF:Dy^{3+} and PL spectra of V-YOF:Tm^{3+} Phosphors.

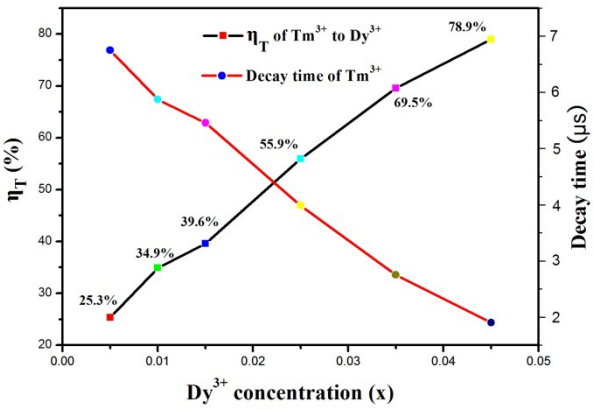

Fig. S5 Scatter plot of decay time of Tm^{3+} and energy transfer efficiency from Tm^{3+} to Dy^{3+}.

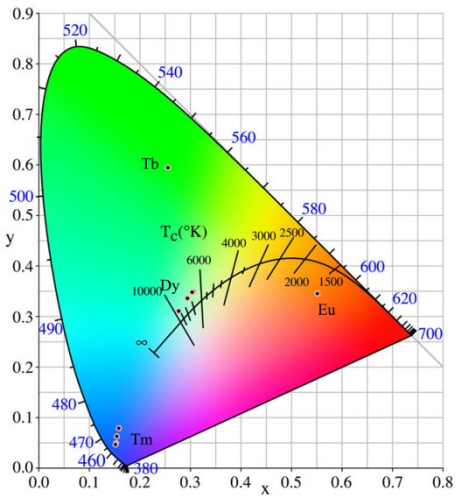

Fig. S6 CIE chromaticity diagram for V-YOF:0.05Ln^{3+} (Ln= Tm, Dy, Tb, Eu) synthesized under different conditions.

Table. S1 CIE chromaticity coordinates (x, y) for V-YOF:0.05Ln^{3+} (Ln= Tm, Dy, Tb, Eu) synthesized under different conditions.

Sample CIE(x,y) Condition	pH=8 NaF	pH=8 NH_4F	pH=8 KF	pH=10 NaF	Standard color coordinates
V-YOF:0.05Tm^{3+}	(0.153,0.049)	(0.155,0.062)	(0.158,0.079)	(0.152,0.046)	Blue (0.14,0.08)
V-YOF:0.05Dy^{3+}	(0.307,0.350)	(0.278,0.310)	(0.295,0.336)	(0.304,0.348)	White (0.33,0.33)
V-YOF:0.05Tb^{3+}	(0.255,0.590)	(0.255,0.589)	(0.255,0.589)	(0.257,0.595)	Green (0.21,0.71)
V-YOF:0.05Eu^{3+}	(0.534,0.344)	(0.491,0.316)	(0.541,0.344)	(0.552,0.346)	Red (0.67,0.33)