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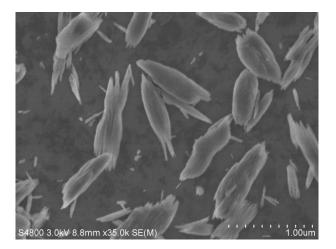


Fig. S1 SEM image of the LaCO₃F sample.

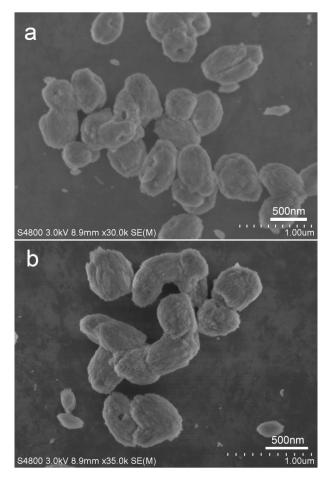


Fig. S2 SEM images of the $CeCO_3F:x0.06Tb^{3+}$ (a), $CeCO_3F:0.08Eu^{3+}$ (b) samples.

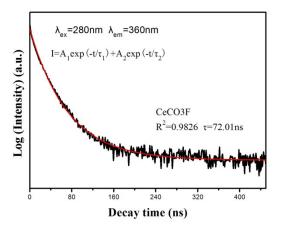


Fig. S3 Representative decay curves for the luminescence of Ce^{3+} in $CeCO_3F$.

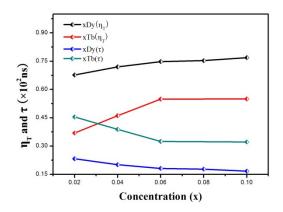


Fig. S4 Scatter plot of decay time of Ce^{3+} and energy transfer efficiency from Ce^{3+} to Dy^{3+} and Tb^{3+} .