

*Supporting Information*

**Tunable photoluminescence in  $\text{Lu}_3\text{Al}_5\text{O}_{12}$ -  
 $\text{Lu}_2\text{CaMg}_2\text{Si}_3\text{O}_{12}$  solid-solution phosphors  
manipulated by synchronous ions co-  
substitution**

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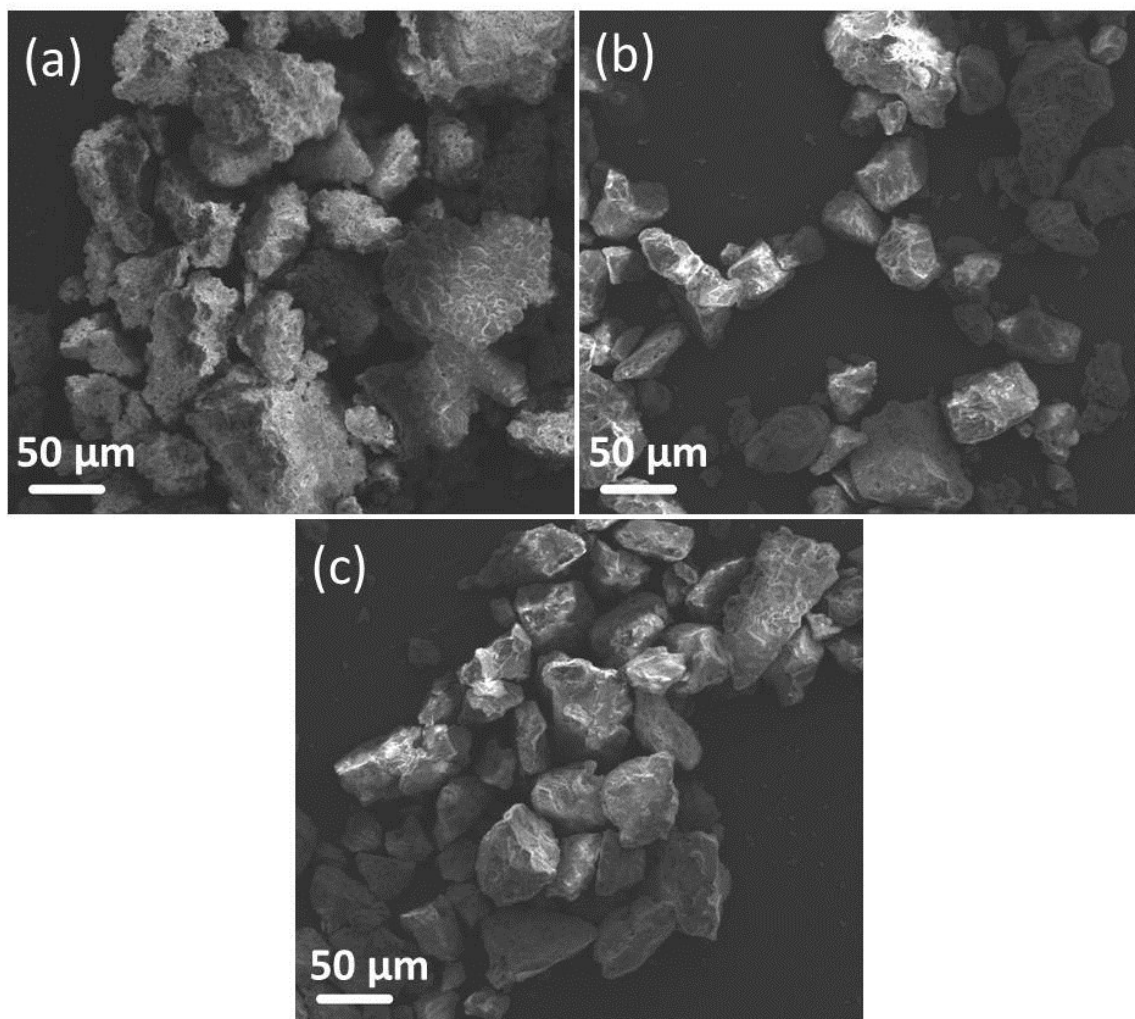
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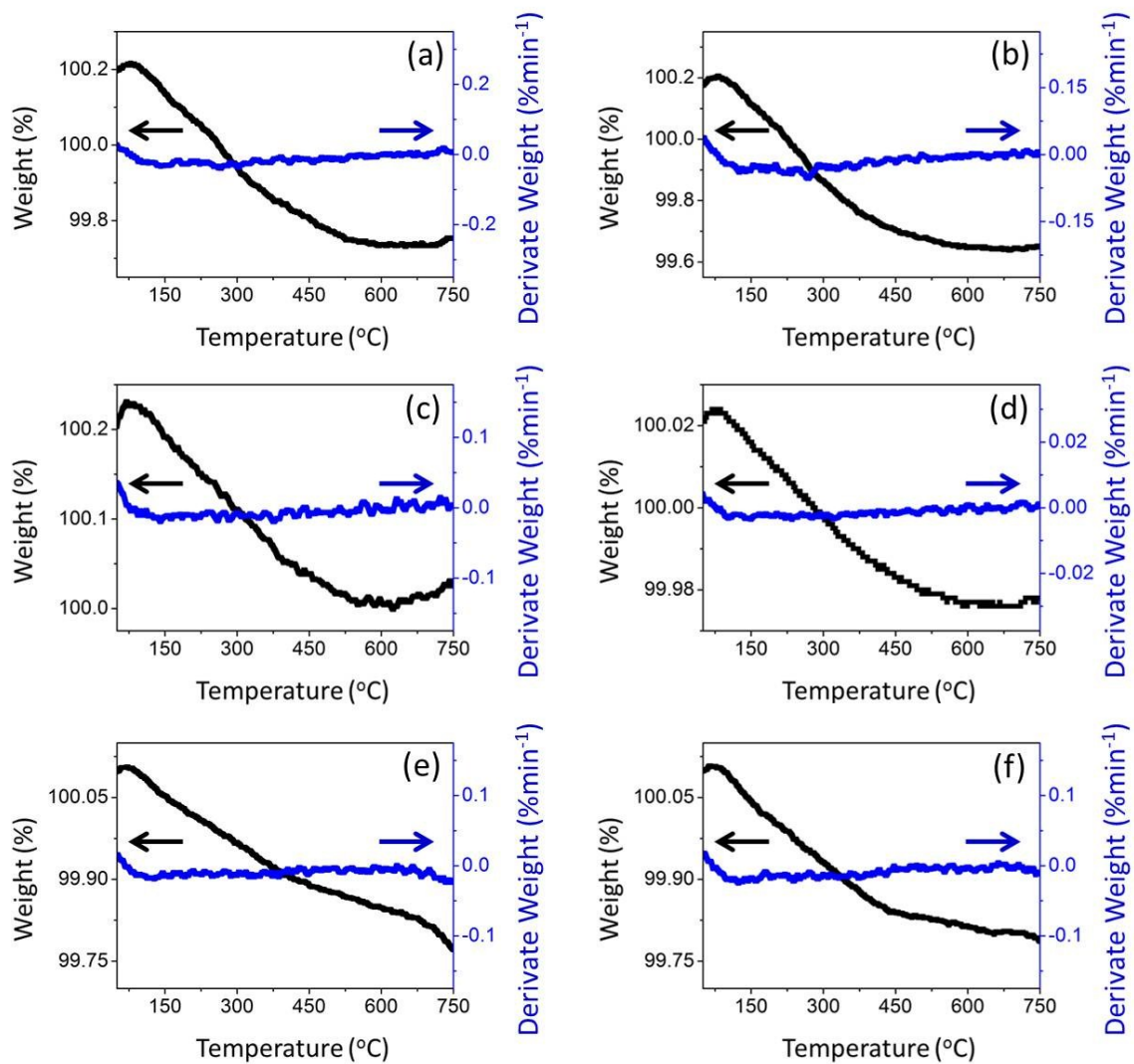
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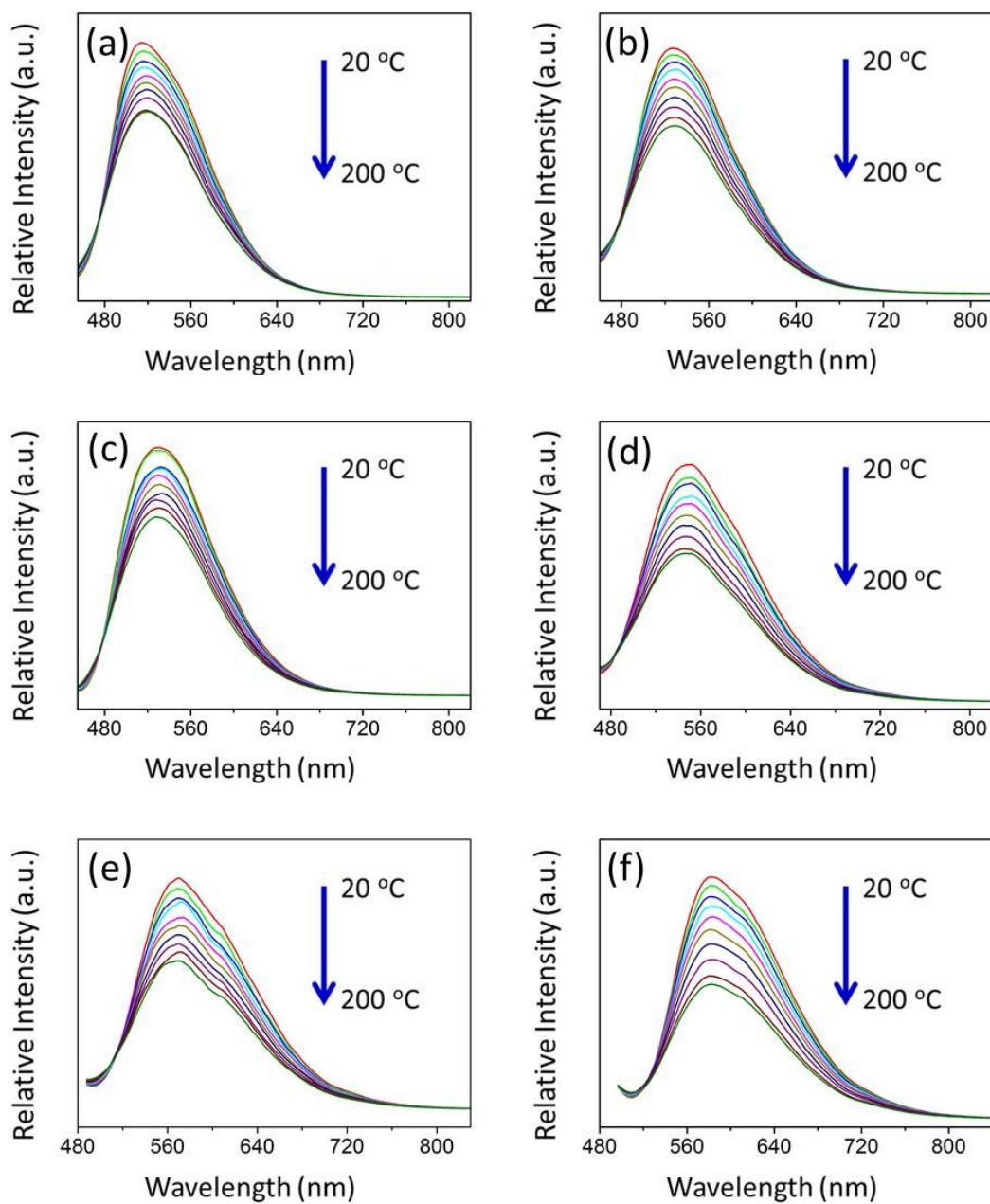
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**Fig. S1** SEM images of representative samples in the  $\text{Lu}_{1.97}\text{Ce}_{0.03}\text{Lu}_{1-x}\text{Ca}_x\text{Al}_{4-2y}\text{Mg}_y\text{Si}_y\text{Al}_{1-x}\text{Si}_x\text{O}_{12}$  solid-solution phosphors (a,  $x = 0, y = 0$ ; b,  $x = 0.6, y = 1.2$ ; c,  $x = 1, y = 2$ ).



**Fig. S2.** TG and DTG curves of the  $\text{Lu}_{1.97}\text{Ce}_{0.03}\text{Lu}_{1-x}\text{Ca}_x\text{Al}_{4-2y}\text{Mg}_y\text{Si}_y\text{Al}_{1-x}\text{Si}_x\text{O}_{12}$  solid-solution phosphors (a,  $x = 0, y = 0$ ; b,  $x = 0.2, y = 0.4$ ; c,  $x = 0.4, y = 0.8$ ; d,  $x = 0.6, y = 1.2$ ; e,  $x = 0.8, y = 1.6$ ; f,  $x = 1, y = 2$ ).



**Fig. S3.** PL spectra of the  $\text{Lu}_{1.97}\text{Ce}_{0.03}\text{Lu}_{1-x}\text{Ca}_x\text{Al}_{4-2y}\text{Mg}_y\text{Si}_y\text{Al}_{1-x}\text{Si}_x\text{O}_{12}$  solid-solution phosphors at different temperatures (a,  $x = 0, y = 0$ ; b,  $x = 0.2, y = 0.4$ ; c,  $x = 0.4, y = 0.8$ ; d,  $x = 0.6, y = 1.2$ ; e,  $x = 0.8, y = 1.6$ ; f,  $x = 1, y = 2, \lambda_{\text{ex}} = 445\text{-}468\text{ nm}$ )